THE IRON TRADE REVIEW

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MAR 1 1918.
UNIV. OF MICH.

MOLTRUP

FINISHED KEYS

COLD

DRAWN

STEEL

BARS

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BEAVER FALLS, PENNA.

Chicago and Detroit—Central Steel & Wire Co.
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Cleveland—H. D. Cushman Co.

Advertisers' Index, pages 152-153. Contents, page 65. "Where-to Buy," page 74.
Engineering Directory, pages 118-119. Classified Advertisements, pages 128-151.

Shall we burn the Toluol, or shall we shoot it?

Shall we throw away the ammonia, or shall we make it produce wheat?

Shall we pollute the air with tar and gas, or shall we make them produce war materials?

Shall we waste our coal supply, or shall we conserve it?

A KOPPERS By-Product coke plant will produce the maximum yield of coke and will recover from the coal the tar, ammonia, gas and toluol that is wasted in bee hive coking and in burning raw coal.

H. KOPPERS COMPANY

PITTSBURGH, PA.

Builders of By-Product Coke Plants

Say you saw it in THE IRON TRADE REVIEW

THE IRON TRADE REVIEW

Vol. LXII Cleveland, February 28, 1918 *No.* 9

Works Production Still Lagging

Progress in Restoring Normal Conditions Disappointing in Certain Lines—Coke Situation Disturbing Factor Owing to Erratic Car Supply—Nonwar Business in Steel Slumps—Ready to Make Ore Contracts

DISAPPOINTING progress is attending the vigorous efforts being made to re-establish normal iron and steel production. Coke remains an uncertain factor, for while deliveries have shown initial improvement, car supply again is receding below needs and expectations. The Pennsylvania railroad facilities in the Connellsville region especially are in poor shape. Eastern steelmakers are operating from 50 to 75 per cent of capacity. A Coatesville plate mill has resumed after two weeks' idleness, but other eastern plants still are shut down. Steel Corporation plants show a better operating record with blast furnaces at 75 per cent, steel works at 85 per cent, and finishing mills at 80 to 85 per cent of capacity. It is estimated authoritatively the government is taking from 75 to 80 per cent of present steel output. General domestic demand for steel has fallen off sharply during the past two weeks.

Commandeers Coke Tonnage

A more vigorous policy continues to be shown by the government in distributing raw material where the need is most pressing, in order to sustain or increase production. Connellsville coke in excess of 20,000 tons monthly has been commandeered by the fuel administration for the Midvale Steel & Ordnance Co. Recently eastern merchant furnaces vigorously protested against such governmental procedure in behalf of the Midvale and Bethlehem Steel companies. A smaller tonnage of coke also has been directed to Pottstown, Pa., where low phosphorus iron is being made by government order. A further lot of 15,000 tons of low phosphorus ore has been acquired in Cuba by those in charge of pig iron distribution. This will be brought in and converted by eastern furnaces into low phosphorus iron for gun forgings.

Sellers of Lake Superior iron ore are ready to contract. They have incorporated a new clause providing for a readjustment of the price to meet the action taken in the future by any authorized federal agency. The heavy reservations which have been made will now be translated into contracts, but considerable tonnage remains for sale. Labor conditions in the mining districts are unsatisfactory, the supply being insufficient and the time lost being on the increase.

Gain Little on Orders

Many furnaces have been able to make little progress in cutting down the large volume of 1917 business they were obliged to carry over into this year. This is a factor of importance in the shortage of future iron which grows steadily. A northern Ohio steelmaker, unable to supply his needs with nearby furnaces, is manifesting a willingness to pay virtually a $3 per ton premium because of the freight by seeking 72,000 tons of last half basic in Alabama. The American Bridge Co. has obtained 50,000 to 60,000 tons at Pittsburgh for eastern delivery and the Lukens Steel Co. has increased recent purchases to 50,000 tons or more. A tremendous uncovered future demand for basic remains in the market. In some districts, notably Chicago, the furnaces are holding silicon limits to the lowest possible point in order to increase production. A surprising result reached by an important valley and lake seller after a comprehensive investigation is that 80 per cent of the foundry and malleable grades now being shipped to its customers is going into direct and indirect war work. The impression has been general that the foundries were not nearly as extensively engaged along essential lines. The government is having allocated a lot of 17,000 tons of special malleable for a large car wheel maker in the middle west. This iron is for car repairs.

Confusion growing out of the inequalities in the original differentials fixed on iron and steel scrap is expected to be cleared away by the superseding schedule put out in the week. Prices have been carefully adjusted to chemical and physical qualities and to consumptive uses. The question of sales commissions still is to be settled.

The Iron Trade Review
EDITORIAL

Country Faces Iron Famine--Government Must Act

SANE and careful valuation of all factors points to the positive conclusion that the country is moving steadily toward a famine condition in pig iron which is likely to exceed in acuteness any past period of similar stringency. Already some of the largest merchant producers, particularly in lake and valley districts, have virtually sold themselves out of the market for the last half. And these bookings, though very large, appear to have effected no appreciable diminution of the huge requirements that are pressing forward daily to be satisfied and must be turned aside. The shortage in steelmaking grades especially is large and widespread. It is not uncommon to hear furnacemen declare they could book the full last half output of their plants in a single day were they able or willing.

Several circumstances have contributed strongly to create the serious condition that now obtains. Crippling of furnace operations by winter weather of unparalleled severity and by an extraordinary inadequacy of transportation and fuel needs during the past three months alone, is shown definitely and accurately to have caused an irreparable loss of from 1,500,000 to 2,000,000 tons of production. As the cumulative result of unfavorable operating conditions of many weeks' duration, a great tonnage of orders originally entered for 1917 delivery, has been carried over into this year. With many furnaces, this has amounted to from 15 to 20 per cent of last half output. This overflow must be provided for out of 1918 production. This physical handicapping of the industry has come at a time when the natural dislocation and realignment of all business enterprise arising from a war situation, where iron and steel are fundamental, have extended far.

As the iron market has become restricted to free buying, the government has been forced by war necessities to exert greater direction correspondingly in the matter of distribution. Its allocations of tonnage for consumers with war contracts who have been unable to supply their own needs, have been increasing steadily. This process promises to be maintained indefinitely with an ever-widening train of effects upon consumption and upon the whole industry. Carried to its logical conclusion, it means conscription of tonnage and finally the endless confusion of pyramiding essential requirements. The result would be disastrous both to war production and to other business, directly or indirectly connected with the iron industry.

The government must act to forestall such an outcome. To do so, its present methods of erratic interference with regular distribution, exercised as necessity dictates, will not be sufficient. Greater and more systematic supervision not merely over the end of distribution or delivery but at the beginning when the sale is made, is necessary. Under all circumstances it would be far better for nonwar industry to know exactly where it stands when it appears in the market to buy iron for future delivery. If it is able to buy, it should thereby be entitled to a reasonable assurance that it will get delivery as agreed. Otherwise it is operating on chance and speculating with its very existence. Its just due is the opportunity to obtain a proper appreciation of its own position so that it can make all necesasry adjustments in ample time. It should not be left under the present hazards of buying iron today, only to have it taken away from it tomorrow. The best way to safeguard the established business enterprise of the country is for the government to exercise a comprehensive regulation of raw material sales in the open market which would be guided by the requirements of war. To continue the merchandising of iron on the old regular-customer, or "first-come-first-served" plan, only means disappointment and probable disaster for many consumers.

Clearing Up a Confused Situation

PERHAPS the most comprehensive branch of the iron and steel industry is that which embraces the marketing of scrap. An understanding of the various market factors and trade customs requires an experience and a broad and general knowledge whose scope covers practically all other branches of the iron and steel industry. Therefore, the fixing of maximum prices on scrap is a large undertaking. It calls for an exact appreciation of the requirements of each consuming industry, and of the complicated conditions of supply. For the reason that all factors had not been taken into consideration, the four base prices announced by President Wilson, together with the differentials which later were fixed by the American Iron and Steel institute, did not constitute a sufficiently comprehensive schedule. Several gaps

EDITORIAL

were left which gave opportunity for uncertainty and dissatisfaction.

As an illustration, one of the most confusing points was with reference to the price on No. 1 machinery cast for use in foundries. To this grade the maximum price of $30, delivered, was applied, but the wording of the announcement lacked definiteness and the trade consequently was left in doubt as to whether $30 was the maximum price on this grade only when sold as a substitute for heavy melting steel, or whether it was to be regarded as the absolute maximum to all consumers. As a result of the many inquiries which resulted, a ruling was made that $30 should be regarded as the maximum on No. 1 machinery cast, no matter to whom sold. This ruling aroused many protests since it did not take into consideration the fact that No. 1 machinery cast always had brought several dollars more per ton when prepared for and sold to foundries than when sold to steel works. Later expressions from high authorities created doubt as to whether this ruling was considered even by its authors as being final. As a result, many scrap dealers felt justified in selling No. 1 machinery cast to foundries at $33 to $34, delivered.

This situation, of course, was an intolerable one and it resulted a few weeks ago, as previously reported in THE IRON TRADE REVIEW, in the appointment by the American Iron and Steel institute of a new, larger and more representative subcommittee on iron and steel scrap. Elsewhere in this issue is published an announcement by the institute of a new schedule of scrap prices which last week was reported by the new subcommittee and approved by the committee on steel and steel products, and which now is in effect. The new schedule is complete and clearly worded and opportunities for doubt and misconstruction no longer exist. For this happy condition all scrap producers, dealers and consumers, constituting practically the entire iron and steel industry, are deeply indebted to the new subcommittee, which achieved it after a great deal of hard work and personal sacrifice.

A notable feature of the schedule is the application of prices and differentials to gross tons. The inconvenience of constantly translating these prices into terms of net tons reasonably can be expected to reduce to a minimum the transactions of business on a net ton basis. This provision of the new schedule undoubtedly will result in making the gross ton the universal scrap unit in this country, which it is believed will be an advantage to all concerned.

War's Effect on the Storeroom

WAR has taught the American people the absolute necessity for saving. This means not only saving food and currency but various materials necessary for keeping the cogs of our great iron and steel industry turning as well. All sorts of material, such as nuts, bolts, pipe fittings, and a thousand and one other supplies usually carried in the store room of iron and steel plants are becoming scarcer each day. Many shelves which before the war sagged under their load, now are bare.

Previous to the war workmen were urged to practice economy lest the "cost of repairs" would show an increase over previous reports. This was drilled into them daily but in spite of that fact they often were exceedingly extravagant in the use of material. They set out to do a repair job with the expectation of completing it in a specified time. Probably the job was that of removing nuts and bolts from a machine or a cast iron elbow from a pipe line. Remembering that saving time is one of the things required of them, they discarded all thoughts of economy and removed the nuts by means of a cold chisel and sledge or broke the cast iron elbow with a ball pein hammer. In either case the damaged material was doomed to the stock pile.

Workmen are not always to blame for this waste. It has been said that "a good man does what he is told"; and if this is true those directly responsible for the wasteful practice outlined largely are to be found in higher positions. But foremen are taking a different attitude toward saving since the shortage of material has become prevalent.

There were times when stocks and stores were easily and quickly replenished but this is not the case today. As a result, material is being dealt out over the store room counters more sparingly. Mill managers realize the time is ripe to impress upon the minds of their men the need of using old material. It would be to the company's advantage to appoint a "reclamation clerk" whose duties would include a daily inspection trip through the mill for the purpose of looking after all discarded material. This should be removed to his department for assortment, no matter whether it is a ¼-inch pet cock or a standard size car wheel. The material should be issued from this department whenever possible and thus would be overcome to a great extent the demands usually made upon the store room. All of which goes to show that there are many ways of making money without spending it.

Iron and Steel Prices

Corrected to Wednesday Noon

SCRAP, WAREHOUSE AND IRON ORE PRICES ON PAGE 578

PIG IRON

Bessemer, valley	$36.30
Bessemer, Pittsburgh	37.25
Basic, Pittsburgh	33.95
Basic, eastern Pa.	33.00
Basic, Buffalo	33.00
Malleable, Pittsburgh	34.45
Malleable, Chicago	33.50
Malleable, Philadelphia	34.00 to 37.50
Malleable, Buffalo	33.50

GOVERNMENT SCHEDULE

1.75 to 2.25 silicon (No. 2 foundry, No. 2 plain, and No. 3 southern), $33 furnace base.

2.25 to 2.75 silicon (No. 2X, No. 1 Northern foundry, and No. 2 southern), base plus 50c.

2.75 to 3.25 silicon (No. 1X, No. 2, soft), base plus $1.50.

Over 3.25 silicon, $34.50, plus $1.00 for each ½ per cent of silicos.

No. 1X, Phila.	35.25 to 35.50
No. 2 foundry, Pittsburgh	33.95
No. 2 foundry, Cleveland	33.95
No. 2 foundry, Ironton	33.00
No. 1 foundry, Chicago	33.50
No. 2 foundry, Chicago	33.00
No. 2X foundry, Phila.	34.25 to 34.50
No. 2X foundry N. J. tide	34.25 to 34.50
No. 2X foundry, Buffalo	33.50
No. 2 plain, Philadelphia	33.75 to 34.00
No. 2 plain, N. J. tide	33.75 to 34.00
No. 2 southern Birmingham	33.00 to 33.50
No. 2 southern, Cincinnati	36.40
No. 2 southern, Chicago	37.50
No. 2 southern, Phila. del.	38.30 to 39.40
No. 2 southern, Cleveland	37.50
No. 2 southern, Boston	39.50
No. 2 southern, St. Louis	35.90
Virginia, No. 2X, furnace	33.50
Virginia, No. 2X, Phila.	36.77
Virginia, No. 2X, Jersey City	37.02
Virginia, No. 2X, Boston	37.27
Gray forge, Pittsburgh	32.95
Silveries, 8 per cent, furnace	46.00
Silveries, 8 per cent, Chicago	48.54
Low phos. standard, Phila.	55.00 to 56.00
Low phos., Lebanon furnace	50.00
Low phos., Pittsburgh	53.00
Charcoal, Superior, Chicago	37.50
Charcoal, Superior, Buffalo	39.75
Charcoal, southern furnace	43.00

COKE

(At the ovens)

Connellsville furnace	$6.00
Connellsville foundry	7.00
Wise county furnace	6.00
Pocahontas furnace	6.00
New River foundry	7.00
New River furnace	6.00
Wise county foundry	7.00

FERROALLOYS

Ferromanganese, delivered.	$250.00
Spiegel, 20 per cent fur.	60.00
Spiegel, contracts, furnace.	60.00
Ferrocarbon titanium, carloads, maker's plant	160.00
Ferrosilicon, 50 per cent, first quarter, Pittsburgh.	175.00 to 180.00
Ferrosilicon, 50 per cent, Pitts., remainder of 1918	155.00 to 175.00
Bessemer ferrosilicon, 9 per cent.	$54.00
Bessemer, ferrosilicon, 10 per cent.	55.00
Bessemer ferrosilicon, 11 per cent.	58.30
Bessemer ferrosilicon, 12 per cent.	61.60

Ferrosilicon prices at Ashland, Ky., Jackson and New Straitsville, O.

SEMIFINISHED MATERIAL

BILLETS

Open-hearth, Pittsburgh	$47.50
Open-hearth, Philadelphia	50.50
Open-hearth, Youngstown	47.50
Bessemer, Pittsburgh	47.50
Bessemer, Youngstown	47.50
Forging, Pittsburgh	60.00
Forging, Philadelphia	63.00

SHEET BARS

Open-hearth, Pittsburgh	$51.00
Open-hearth, Youngstown	51.00
Bessemer, Pittsburgh	51.00
Bessemer, Youngstown	51.00

WIRE RODS AND SKELP

Wire rods, Pittsburgh	$57.00
Grooved skelp, Pitts.	2.90c
Sheared skelp, Pitts.	3.25c

SHAPES, PLATES AND BARS

(In cents per pound)

Structural shapes, Pitts.	3.00c
Structural shapes, Phila.	3.185c
Structural shapes, N. Y.	3.195c
Structural shapes, Chgo.	3.00c
Tank plates, Chicago	3.25c
Tank plates, Pittsburgh	3.25c
Tank plates, Philadelphia	3.435c
Tank plates, New York	3.445c
Bars, soft steel, Pittsburgh	2.90c
Bars, soft steel, Chicago	2.90c
Bars, soft steel, New York	3.095c
Bars, soft steel, Phila.	3.085c
Bar iron, Chicago	3.50c
Bar iron, Phila.	3.50c to 3.685c
Bar iron, Cleveland	3.64c to 3.70c
Bar iron, New York	3.695c
Bar iron, Pittsburgh	3.50c
Hard steel bars, Chicago	3.00c

RAILS, TRACK MATERIAL

Angle bars, Pittsburgh base.	3.25c
Angle bars, Chicago base	3.25c
Standard bessemer rails, mill	$55.00
Stand. open-hearth rails, mill	57.00
Light rails, 25 to 45, mill	3.00c
Relaying rails, light, St. L.	75.00 to 80.00
Spikes, railroad, Pitts.	3.90c
Track bolts, Pittsburgh	4.90c
Track bolts, Chicago	4.80c to 4.90c
Tie plates, Chicago	3.25c

WIRE PRODUCTS

(Per 100 lbs. to jobbers; retailers 5c more)

Wire nails, Pittsburgh	$3.50
Coated nails, Pittsburgh	3.45
Plain wire, Pittsburgh	3.25
Galvanized wire, Pittsburgh	3.95
Polished staples, Pittsburgh	3.65
Galvanized staples, Pbgh.	4.35
Barb wire, painted, Pitts.	3.65
Barb wire, galvanized, Pitts.	4.35
Cut nails, Pittsburgh	4.00

CHAIN, PILING, STRIP STEEL

(In cents per pound)

Chain, ¾ in. proof coil, Pitts.	8.00c
Sheet piling, base, Pitts.	4.00c to 5.00c

Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100 inch and heavier, base per 100 pounds, 6.50c.

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SHEETS

(In cents per pound)

SHEET MILL BLACK

No. 28, open-hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c
No. 28, open-hearth, Chi.	5.215c

TIN MILL BLACK

No. 28, open-hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c

GALVANIZED

No. 28, open-hearth, Pitts.	6.25c
No. 28, bessemer, Pitts.	6.25c
No. 28, open-hearth, Chi.	6.465c

BLUE ANNEALED

No. 10, open-hearth, Pitts.	4.25c
No. 10, bessemer, Pitts.	4.25c
No. 10, open-hearth, Chi.	5.715c to 6.215c
No. 10, open-hearth, Phila.	4.435c

TIN PLATE

(Per 100 lb. box)

Tin plate, coke base, Pitts.	$7.75

IRON AND STEEL PIPE

Base Pittsburgh

Base Pittsburgh	Black (Per cent off)	Galv. (Per cent off)
¼ to 3 in., butt, steel	51	37½
¼ to 3 in., butt, iron	33	17

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	30
Iron, 3½ to 4½ inches, c. l.	12½

CAST IRON WATER PIPE

(Class B Pipe)

Four-inch, Chicago	57.30
Six-inch and over, Chicago	54.30
Four-inch, New York	58.35
Six-inch and over, N. Y.	55.35
Four-inch, Birmingham	52.00
Six-in. and over, Birmingham	49.00

HOOPS, BANDS, SHAFTING

Class A pipe is $1 higher than Class B.

Hoops, Pittsburgh	3.50c
Bands, Pittsburgh	2.90c
Shafting, Pitts., carloads	17 off to list

RIVETS

Structural rivets, Pittsburgh.	4.65c
Boiler rivets, Pittsburgh	4.75c
Rivets ⅞ in. and smaller, Pitts.	45 and 10 off

NUTS AND BOLTS

(Delivered within 20-cent freight radius)

CARRIAGE BOLTS

(⅜ x 6 inches, smaller and shorter)

Rolled thread	50–5 off
Cut thread	40–10–5 off
Larger and longer	40 off

MACHINE BOLTS

(¾ x 4 inches, hot pressed nuts)

Rolled thread	50–10–5 off
Cut thread	50–5 off
Larger and longer	40–10 off
Cold pressed semi finished hexagon nuts ⅝ in. and larger	60–10–10 off
Cold pressed semi finished hexagon nuts ⅞ in. and smaller	70–5 off
Gimlet and cone point lag screws	50–10 off

NUTS

Hot pressed, square blank	2.50c off
Hot pressed, square tapped	2.30c off
Hot pressed, hexagon blank	2.30c off
Hot pressed, hexagon tapped	2.10c off
Cold pressed, square blank	2.25c off
Cold pressed, square tapped	2.00c off
Cold pressed, hexagon blank	2.25c off
Cold pressed, hexagon tapped	2.00c off

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago)

Quotation on leading products February 27, average for January, 1918, average for November, 1917, and average for February, 1917. Prices are those ruling in the largest percentage of sales at the dates named

	Prices Feb. 27, 1918	Average prices Jan., 1918	Nov., 1917	Feb., 1917
Bessemer pig iron, Pittsburgh	$37.25	$37.25	$37.25	$35.95
Basic pig iron, Pittsburgh	33.95	33.95	33.95	30.95
*No. 2 Foundry pig iron, Pitts.	33.95	33.95	33.95	33.95
*No. 2, Foundry pig iron, Chi.	33.00	33.00	33.00	31.25
Lake Superior charcoal, Chicago	37.50	37.50	37.50	34.50
Malleable, Chicago	33.50	33.50	33.50	31.25
**Southern, No. 2, Birmingham	33.50	33.50	33.50	24.50
*Southern Ohio No. 2, Ironton	33.00	33.00	33.00	33.00
Basic, eastern Pa.	33.00	33.00	33.00	30.50
**No. 2X Virginia, furnace	33.50	33.50	33.50	29.00
**No. 2X foundry, Philadelphia	34.25	34.25	34.00	32.00
Ferromanganese, delivered	250.00	250.00	247.00	265.00
Bessemer billets, Pittsburgh	47.50	47.50	47.50	62.50
Bessemer sheet bars, Pittsburgh	51.00	51.00	51.00	62.50
Open-hearth sheet bars, Pitts.	51.00	51.00	51.00	62.50
Open-hearth billets, Pitts.	47.50	47.50	51.00	62.50
Steel bars, Pittsburgh	2.90	2.90	2.90	3.00
Steel bars, Chicago	2.90	2.90	2.90	3.15
Iron bars, Philadelphia	3.50	3.648	4.335	3.259
Iron bars, Cleveland	3.64	3.64	4.00	3.00

*1.75 to 2.25 silicon. **2.25 to 2.75 silicon.

	Prices Feb. 27, 1918	Average prices Jan., 1918	Nov., 1917	Feb., 1917
Iron bars, Chicago mill	$3.50	$3.50	$4.10	$3.00
Beams, Chicago	3.00	3.00	3.00	3.38
Beams, Pittsburgh	3.00	3.00	3.00	3.25
Beams, Philadelphia	3.185	3.185	3.185	3.509
Tank plates, Pittsburgh	3.25	3.25	3.25	3.75
Tank plates, Chicago	3.25	3.25	3.25	3.94
Tank plates, Philadelphia	3.435	3.435	3.435	5.009
Sheets, blk., No. 28, Pitts.	5.00	5.00	5.30	4.56
Sheets, blue anld., No. 10, Pitts.	4.25	4.25	4.60	4.37
Sheets, galv., No. 28, Pitts.	6.25	6.25	6.50	6.50
Wire nails, Pittsburgh	3.50	3.50	3.50	3.00
Connellsville furnace coke	6.00	6.00	6.00	8.00
Connellsville foundry coke	7.00	7.00	6.60	6.50
Heavy melting steel, Pitts.	30.00	30.00	29.60	21.87
Heavy melting steel, eastern Pa.	30.00	29.80	27.50	20.50
Heavy melting steel, Chicago	30.00	29.70	28.50	21.65
No. 1 wrought, eastern Pa.	35.00	35.00	35.70	27.00
No. 1 wrought, Chicago	35.00	35.00	35.00	27.00
Rerolling rails, Chicago	35.00	35.30	35.70	25.63
Car wheels, Chicago	30.00	30.40	27.50	18.31

(For Additional Prices See Page 578)

Demand For Basic More Insistent

Steel Plants Strive to Cover For Future But Encounter Shortage of Unsold Tonnage —Ohio Melter Seeks 72,000 Tons of Basic in South—American Bridge Co. Gets Tonnage—Production Disappointing

Philadelphia, Feb. 25.—Purchases of basic for eastern consumption during the past week are reported at fully 75,000 tons. The American Bridge Co. is understood to have arranged for 50,000 to 60,000 tons for second half shipment from the Pittsburgh district to its Pencoyd plant. The Lukens Steel Co. has increased its purchases of basic and altogether during the past two weeks is understood to have bought at least 50,000 tons, all for second half. The Penn Seaboard Steel Corp.'s inquiry for 4000 to 7000 tons per month over the second, third and fourth quarters has not yet been closed. Among new inquiries for basic is one from a Pittsburgh district consumer for 5000 to 10,000 tons per month over the second quarter. Outside of the sales of basic, transactions of the past week comprised principally small tonnages of off foundry, high silicon and high manganese foundry, off malleable, off bessemer, etc. Numerous inquiries for 1000 tons or more of foundry for second half and several for bessemer and malleable are out, but none of the furnaces is able to quote on them apparently. In general, inquiry is of very much smaller proportions than it would be if supplies were to be had, but all consumers understand the situation and realize that in most cases it is a waste of time and effort to try to locate iron at this time.

Huge Tonnage is Unsatisfied

Cleveland, Feb. 26.—Sellers say they could dispose of 500,000 tons of various grades of iron were it available. This is not surprising in view of the tremendous tonnage that is seeking acceptance, especially in steelmaking iron. The estimate of obtainable business expresses the severe shortage which is steadily growing more pronounced. One northern Ohio works unable to get accommodations from nearby makers is inquiring from Alabama makers for 72,000 tons of basic for last half. Another northern Ohio consumer has revised an inquiry for 20,000 tons for second half; and a steel foundry interest is sounding the market on a round forward tonnage. The request for 75,000 to 100,000 tons for last half from a melter in the Pittsburgh district still is open. Other buyers of basic are in the market. A steelmaker in this district who was seeking 40,000 tons or so of basic and bessemer, is reported to have placed some tonnage with nearby makers. Leading producers in this district are virtually sold up for last half. One of them disposed of about 150,000 tons in February. A local interest continues to sell freely of last half malleable and foundry to regular customers. The Westinghouse Electric & Mfg. Co. has closed for 12,000 to 15,000 tons of last half malleable and foundry largely with Cleveland and valley makers. Southern makers of iron are able to ship more liberally to this district. Among government matters the largest piece of business concerns the allocation of 17,000 tons of carwheel malleable for February-June delivery to an important wheel foundry of which 15,000 tons are for the Chicago and 2000 tons for the Boston district. This iron is for car repairs. A 2000-ton lot of basic to go to St. Louis will be furnished from eastern Ohio and Chicago. A lot of 1000 tons of charcoal for an Illinois arsenal has been reduced to 100 tons and placed. Another inquiry for 1000 tons of foundry for the Italian gov-

ernment is up. A leading lake seller has made a comprehensive survey of his customers to whom shipments now are being made and finds that 80 per cent of the malleable and foundry iron being furnished is for direct and indirect war work.

Chicago Market Tighter

Chicago, Feb. 26.—Placing of contracts for last half pig iron continues to be done steadily in this district and by far the greater portion of last half production is well under contract. Some restrictions are being placed on tonnages accepted by sellers and past contracts are being taken as the basis of present buying. Considerable restriction is also being placed on analysis and production of silicon is being limited with the view to turning out as heavy a tonnage of iron as possible. Contracts will not be made by the leading interest here for basic iron containing silicon over 1.25 per cent and silicon in foundry iron is being held down to the lowest possible point. Inquiry continues widespread and practically all consumers are seeking to cover their last half requirements. There is also considerable inquiry for prompt iron and for second quarter delivery. The latter class of inquiry is meeting small encouragement as there appears to be almost nothing available this side of mid-year. Producers of Lake Superior charcoal iron probably will have their entire output covered in a short time. One important interest has sold practically all its last half iron and another larger producer which has not yet opened its books probably will contract its entire last half tonnage within a few days, when it is ready to accept contracts. Silvery iron has been difficult to obtain but a Tennessee stack is now willing to sell iron containing silicon from four to ten per cent with phosphorus 1.50 to 2.25 per cent for last half delivery. Southern producers continue to contract, but some are practically sold up on standard grades and have little to offer. One large southern producer is offering some No. 2 and some No. 3 while another large southern maker has withdrawn for the present on No. 2 foundry.

Wholesale Shutdowns Threatened

Boston, Feb. 25.—The pig iron situation in this territory is fast approaching a crisis and if consumers do not soon get larger shipments, a wholesale shutting down of plants may follow. Consumers,with few exceptions, can see the bottoms of their stock piles and with nothing on the way, the need of new supplies is acute. Meanwhile, there are inquiries for lots ranging anywhere from 100 to 1000 tons from melters who underestimated their probable needs and not a ton is being offered to meet these inquiries. The probabilities are that matters are looking up in the matter of deliveries, but it is hard to find anybody among the iron trade who will go on record as saying when there will be any improvement. The drive to relieve the coal shortage in this section is using many cars for coal that otherwise would be available for the transportation of iron and other raw materials. The word from producing sections is that the furnace operations have increased but until the transportation tangle is unwound, New England seems likely to suffer in the matter of shipments. Quite a little business has been booked for Connellsville coke for six and twelve months, beginning July 1. This business comes from brass foundries, which are unable to secure much crushed coke since the local by-product maker has sold quite freely for domestic purposes to help out the coal scarcity. This demand has reduced the amount available for the foundries, using crucibles. Government prices applied on the Connellsville business.

Foundries in Trouble

Buffalo, Feb. 26.—Though the scarcity of cars still is serious and is causing some producing interests to pile iron, the railroad situation appears to be gradually clearing, Buffalo producers say. Fuel is moving a little more freely though there is room for great improvement. Some furnaces are running as low as 50 per cent of capacity and an average would probably put production at 65 to 70 per cent for this district. Improvement in the rail situation is noted in the fact that roads are accepting shipments they would not touch two weeks ago. One producer estimated that one-half of the embargoes in effect at the height of the tie-up are off. Most of the iron being made is for government purposes either directly or indirectly, leaving little general purpose metal available. What is left is being eagerly sought after but producers are in no great hurry to contract business. Inquiry is very fair, one interest which is not quoting reporting an aggregate demand for 22,000 tons of foundry and malleable during the past week for delivery in the last half. Coke difficulties practically have barred this interest from the market, so the business was passed. Another interest likewise is turning down inquiry. The capacity of this furnace is taken till July. Still another seller contracted for 500 tons of foundry. Foundries are crying for coke and pig iron, indicating that stocks are very low. The transportation situation stands in the way for the producers have the iron but lack cars. Foundries have been urged to appeal to the government.

Southern Foundry Active

Cincinnati, Feb. 25.—Makers of southern foundry iron have practically the whole stage to themselves. Buyers for last half shipment are still plentiful and quite a number of sales were made last week. Some of this iron runs high in silicon and a nearby foundry is understood to have purchased about 750 tons with silicon ranging from 3.25 to 3.75, at the usual advances for this grade. Some sales of southern foundry iron running from 1.75 to 2.25 per cent in silicon have been made to Kentucky and Indiana melters at $33 at furnace for last half shipment. Second quarter business is confined to small sales, mostly of high sulphur iron. Shipments from the south are moving at a better rate, although many points north of the Ohio river are still embargoed. A slight increase in production is being maintained in southern Ohio, but the furnaces there are far behind in shipments on contracts. In a measure this is due to the railroad situation. There is a good demand for the Ohio silvery irons, but none to be had for any shipment. A few cars of Virginia iron are being disposed of in this vicinity.

Buyers Fear Shortage

St. Louis, Feb. 25.—A good, scattering demand for pig iron was in evidence this week but the sustained inquiry of two weeks ago seems to have disappeared. The letting down on the part of consumers is not due to any diminution of their needs but mainly to the fact that producers are out of the market. Northern and eastern furnaces are offering nothing at the moment. One southern maker sold about 1000 tons this week in small parcels but other business was inconsequential. Both consumers and sellers in this district have a well defined belief that a real scarcity is in sight. The demands are far in excess of production at present and no change in this condition is visible for the future. Mills and foundries on the east side have turned down important orders for summer delivery because of the extreme dubiousness of the raw material market. Another potent factor at the moment is the scarcity of coke. One manufacturer said today that he was experiencing much less difficulty in securing pig iron than coke to melt it with. Many other users are in a similar position.

The open weather has done wonders

in relieving terminal congestion and cars are moving freely from mines in the Illinois district.

Sellers Move Cautiously

New York, Feb. 26.—Pig iron sales in the New York district during the past week have consisted largely of small tonnages of high silicon and off-foundry grades for prompt shipment. Second half sales by northern furnaces are made up of only occasional tonnage which circumstances force them to accept from regular customers. Round tonnages for last half also are being sold in this district by the Alabama furnaces. Very little additional second-half selling by eastern makers is expected prior to the action by the government on prices for second quarter delivery dating from April 1. Large quantities of iron could be sold if it were available.

Production is Disappointing

Pittsburgh, Feb. 26.—Receipts of coke at blast furnaces have shown a slight falling off during the past week and the expected increase in pig iron production has been either so slight as to be practically negligible or has actually shown a decline in this district. The Carnegie Steel Co., which had 40 furnaces in operation on Wednesday of last week, had 41 making pig iron today, but owing to the shortage of coke, it may be necessary to bank one or two tonight or tomorrow. The Jones & Laughlin Steel Co. has six of its 11 furnaces in operation, making no gain in production during the past week. Inquiries for iron, particularly for steelmaking grades, still are numerous but have shown a decrease, some consumers apparently withdrawing from this market because of their inability to cover requirements. While there is a distinct shortage of iron of all grades the most acute lack is in basic. Two inquiries, each for 5000 tons of bessemer for prompt shipment, have come out but it is doubtful if the prospective buyers will be able to obtain the iron from sellers in this district. A local steel producer is understood to be in the market for almost any quantity of basic iron that it could obtain. It needs 75,000 to 100,000 tons for last half. Foundries also are making pressing inquiries and it is reported that if a number of them do not cover their needs soon, they will be forced to suspend.

Commandeer Coke Tonnage

Government Directs 20,000 Tons Monthly to Midvale Plants and Other Lots—Car Supply Drags—Adopt New Plan

Pittsburgh, Feb. 26.—More vigorous action has been taken by the government to divert fuel to plants where it is most sorely needed. The fuel administration has commandeered in excess of 20,000 tons monthly for the furnaces of the Midvale Steel & Ordnance Co., and also a smaller tonnage for the Eastern Steel Co., at Pottstown, Pa., where a furnace recently was put on low phosphorus pig iron by the government. Eastern merchant furnaces previously had protested to the government against the commandeering of tonnage for eastern steel works.

Despite the fact that favorable weather for railroading has prevailed for approximately three weeks, the supply of cars in the Connellsville coke region continues to be entirely inadequate. No one appears to be able to give well defined reasons why the extreme shortage should continue to exist. The supply yesterday on the Monongahela railroad was 60 per cent and today 30 per cent. A 30 per cent supply is promised for tomorrow. Some large oven interests whose car rating is as high as 25 a day were unable to receive a single car today. The shortage on the Pennsylvania railroad is especially acute. The shortage of cars has put some consumers in a serious situation. Neither producers nor consumers are taking a hopeful outlook for immediate relief. However, improvement in the quality of coke, some believe, will follow the institution of the plan determined upon by which the car rating of coke plants in the Connellsville region is to be based on the number of ovens available for service and the actual producing capacity of the mines serving such ovens. At present the rating is based on the number of ovens actually in blast. The fuel administration has approved the plan and railroads are preparing necessary tariffs to be filed at once with the interstate commerce commission. The commission will be asked to permit the schedules to become operative in five days after being placed on record. By the new plan it is proposed that coke be produced on a uniform basis and be drawn every 45 and 72 hours instead of under the present system by which it is burned from 96 to 120 hours and even longer. Production for the week ended Feb. 16 totaled 240,772 tons, comparing with 224,145 tons during the preceding week according to *The Connellsville Courier*.

Last Half Foundry Sold

Philadelphia, Feb. 25.—For the first time in some months, sales of beehive foundry coke are being made here for forward delivery. A good many thousand tons have been sold for second half delivery and offers continue to be made. No sales of furnace coke are reported. Spot coke continues unobtainable.

Apprehensive Over Supplies

St. Louis, Mo., Feb. 25.—Activities among coke dealers are confined to taking care of contracts, there being virtually no new business. A thorough canvass of leading dealers elicited the information that aside from a few scattering cars, no sales have been made. The demand continues as urgent as ever and there is no user who has one car due him who would not jump at two or more cars. This attitude of users is an excellent gage of their idea of the future. Absolutely no confidence is felt in future supplies and this feature is having a detrimental effect on activities. Not much improvement is reported in the transportation situation. Cars are scarce, and deliveries on outside contracts will hardly average 50 per cent. Inquiries continue heavy. There was one this week for a considerable tonnage from El Paso, undoubtedly meant for Mexican consumption. Arizona and New Mexico also have sent appeals for even a few cars, and reports from that general region indicate the most acute shortage thus far experienced.

Controversy Checks Production

Birmingham, Ala., Feb. 26.—A little deflection is noted in the coke production in Alabama for home consumption. Independent producers, not at outs with their employes, have been able to get a fairly good supply of coal and all ovens are going on full pace. The cessation of work on the part of several thousand men during the past week affected the coal production of two of the larger makers, which consume this make in their own plants. The trouble is in reference to an alleged noncompliance with the Garfield proposals or agreements for operators and employes. The employes have returned to work generally and have asked the fuel administrator to send a representative here to look into the controversy.

New Prices Greeted Warmly

Buyers and Sellers Welcome Elimination of Uncertainties and Inequalities of Original Schedule—Market Activity Broadens

FOR COMPLETE SCRAP PRICES SEE PAGE 578

Philadelphia, Feb. 25.—Announcement by the American Iron and Steel institute of the revised and amplified schedule of maximum prices on iron and steel scrap, has been received here with great satisfaction. The inclusion of prices on grades not before specifically covered, and the clearly worded definitions as to just what material comes under each price, are expected to eliminate the confusion which heretofore has prevailed with respect to certain grades. One particular source of satisfaction to the trade here is the fixing of $35, delivered, as the maximum price on heavy cast scrap for foundry use, thus differentiating it from cast scrap for steel mills. It is felt the establishment of differentials for each grade will serve as a stimulus to sellers to meet exact specifications. As a result, it is expected, there will be fewer rejections, and the shipping situation will benefit correspondingly. Greater activity has characterized the market. Most of the selling has been by the yards and small dealers, to the large brokers. The latter are eager to get scrap to fill old contracts. Consumers also are showing more interest. The shipping situation has shown a vast improvement during the past week.

Transportation is a Drag

Boston, Feb. 25.—There is no lack of demand for the various grades of scrap but the railroad situation, despite the lifting of embargoes and the lessening of congestion, still is far from normal. There is not the activity nor volume of business there undoubtedly would be with full transportation facilities. Prices, meanwhile, are firm for stocks are not burdensome. Wholesale dealers' paying price per gross ton, f.o.b. shipping point follow: Wrought No. 1, yard long, $30 to $31; horseshoes, $30 to $31; cotton ties, $21 to $22; stove plate, $20 to $20.50; No. 1 machinery, $33.50 to $34.50; No. 2 machinery, $28 to $29; car axles, iron, $43 to $44; steel, $43 to $44; rerolling rails, $30.50 to $31; iron boiler plate, $34 to $35; bundled barrel hoops, $17.50 to $18; wrought iron pipe, new specifications, $27 to $28; steel rails, $26 to $27; No. 1 railroad steel, $26 to $26.50; heavy melting steel, $25.50 to $26.50; axle turnings, $21 to $21.50; machine shop turnings, $13 to $16; cast borings $16 to $17; drop forge trimmings, $21 to $22; and cast iron car wheels, $35 to $37.

More Business Brought Out

New York, Feb. 26.—Although permits are more easily obtainable for the shipment of scrap in this district, the difficulty now confronting dealers is that of obtaining cars. Under present conditions several permits may be necessary for the shipment of one lot of material. This scarcity of cars is due principally to the continued heavy movement of coal. Nevertheless, the situation generally, with regard to the handling of scrap, is improving steadily. This improvement, in turn, is bringing out business which has been held up for weeks as a result of the railroad congestion. Prices generally are very firm and in some instances advances have been made. No. 1 machinery cast, New Jersey points, is up 50 cents to $1 and stove plate and grate bars, New Jersey points, $1. With the official announcement of new differentials the haze of misunderstanding which surrounded the original price schedule appears to have been cleared away.

New Classifications Interest

Pittsburgh, Feb. 26.—Dealers in this district have shown much interest in the new scrap prices and classifications just announced. Apparently the two chief points receiving the attention of dealers relate to the reduction of the price of No. 1 busheling from $35 to $32 a ton, and the question as to whether or not the 3½ per cent commission which dealers have been allowed to charge in excess of scheduled prices. Some still maintain the price of No. 1 busheling should be as low as or lower than for No. 1 heavy melting steel. It is known, however, that the price of No. 1 busheling was set above that of No. 1 heavy melting for the purpose of protecting the interests of iron bar mills. It has been pointed out that open-hearth consumers have been taking large quantities of this grade to the detriment of bar mills, but under the new price classification no scrap to be used for remelting into steel shall be dealt in at a price in excess of the maximum base of $30. Obviously, this would prevent the payment by open-hearth consumers of $32 for No. 1 busheling which it is claimed now can be devoted to bar mills. The opinion is expressed here that the commission of 3½ per cent for dealers still is allowable, although a contrary view is voiced from some other quarters.

Consider Zone Distribution

Buffalo, Feb. 26.—The scrap sky shows up a little brighter due to a stretch of good weather with the prospect that the worst part of the winter has gone. The car situation is a little better and permits are being obtained a trifle more freely. Dealers are gratified at the action of the government in fixing scrap prices inasmuch as it is hoped that it will prove a stabilizer for the market. The immediate result of the revisions will be a clearer classification of the various grades. The staple commodities affected in this district are railroad malleable which is now $35 instead of $30 and No. 1 railroad and machinery cast scrap which is $35 instead of $30. One of the serious questions which is understood to be now under consideration by the American Iron and Steel institute is how isolated plants which must pay heavy freight rates are to obtain scrap under the new prices. It has been suggested that zones be created to take care of this difficulty and this plan is now said to be under consideration. Another question is the disposal of the surplus of certain kinds of scrap, produced in excess in certain districts or for some reason not used by plants of that territory. The problem is whether the dealer must accept a lower price for this scrap or whether the consumer must pay a differential.

Still Expect Commission

Cleveland, Feb. 26.—Scrap iron and steel dealers in this district who awaited the announcement of the institute's subcommittee with more or less trepidation, have scanned the new prices and classifications and are virtually unanimous in the belief that not so much as a ripple will be caused by them. The cut in No. 1 busheling was expected. In some quarters the advance of cupola-size cast scrap above the government pig iron brings the fear that foundrymen may prefer the latter; others point out the pig iron shortage dispels such a belief. Most dealers do not look upon the omission of reference to the 3½ per cent commission as an indication it has been cut off. If they are denied the commission, dealers declare they might as well shut up shop. Direct selling is making its appearance greater than ever before in this market and some fair-sized lots of scrap have changed hands in

this way. With shipments near normal, the great majority of tonnage moving is on contracts entered in November and December. About 1000 tons of low phos have been offered here.

Dealers' Stocks Growing

Cincinnati, Feb. 25.—Dealers' stocks are increasing, but at a very slow rate. Railroad embargoes still prove very embarrassing, and make the sale of scrap for prompt shipment almost an impossibility. There is not much scrap being bought for shipment later on, except in a few cases where melters desire to add to their previous purchases. Prices are slowly nearing the government's schedule, which on some grades are not up to the maximum allowed.

New Prices Not Digested

Chicago, Feb. 26.—Trading in scrap iron and steel in the Chicago market has been delayed for some time, principally on account of lessened operation on the part of consumers. Another factor which has had some effect is the probability of fixed prices being changed and announcement this week has made this a reality. Some surprises are met in the new maximum prices, but, inasmuch as they were compiled by a representative committee, it is believed they will be received with better grace than the former announcement.

Sufficient time has not yet been given to allow dealers to adjust themselves to the new conditions. Some weakness has been manifested in a few items, brought about principally by dealers offering some tonnages at forced sale under the spur of light demand. Somewhat better offerings are being made by railroads, as more open weather allows scrap to be moved. The Santa Fe offers 2300 tons; the Chicago, Burlington & Quincy, 2200 tons; the Rock Island, 1600 tons, and the Monon, 225 tons.

Expect Wholesome Effect

Birmingham, Ala., Feb. 26.—Southern scrap iron and steel dealers talk more confidently of the market and while quotations show but little change there is a belief that the new schedule of the government will have a wholesome effect. The government level of prices has never been reached in the southern market as yet but the grading here is somewhat different than elsewhere. Heavy melting steel has reached a level of $27.50. The strike for an 8-hour day among metal trades employes, including molders, machinists, patternmakers, electricians and others, has caused more or less deflection at foundries.

Steel Needs More Urgent

Necessities Drive Consumers to Vigorous Efforts to Get Material—Sheet Bars Especially Scarce and Finished Production Suffers

Pittsburgh, Feb. 26.—Increased production of billets and sheet bars in this district has resulted in a number of new inquiries coming out, but so far as reported no offerings are being made in the open market. In view of the extreme shortage of steel it seems improbable that semifinished material can be bought freely in the near future. Most producers are using all of their output and some are seeking tonnages from other sources. Supplies for sheet and tin plate mills are somewhat better but operations still are far below normal because of a shortage of sheet bars. Demand for wire rods is active. One inquiry from a Canadian consumer calls for 500 tons for early shipment. Some makers in this district are entirely out of the market and others are not actively soliciting business. Tonnages are said to have been tied up at seaboard because of a scarcity of cargo space and are being offered for resale. Requirement by the government of licenses for imports and exports promises to restrict further sales for foreign delivery.

Sheet Bar Supply in Doubt

Youngstown, O., Feb. 27.—Sheetmakers are in doubt concerning second quarter supplies of open-hearth sheet bars but are making every effort to meet their needs. They are not having much success and are finding it hard to obtain even bessemer sheet bars. One mill manager states he has scoured this and the greater Pittsburgh districts for both open-hearth and bessemer bars and is unable to locate any tonnage which is available immediately or in the near future. The leading valley maker of open-hearth sheet bars reports he has no bars to sell at this time and that his books for this material will be closed indefinitely since the government is requiring practically the entire output of his open-hearth department for shell steel, plates, etc.

Need Steel Urgently

Cleveland, Feb. 26.—The shortage of semifinished steel, especially sheet bars, is pressing more heavily upon consumers and the latter are making more urgent efforts to obtain even small lots of steel to tide them along. Some of them also have renewed negotiations for larger and more extended requirements, including one lot of 10,000 to 12,000 tons for a northern Ohio mill. Recent loss in steel output has caused some makers to refrain from selling discard material and they are using the latter for their own purposes. The government has had before local mills this week additional tonnages of slabs and billets, which the former have been asked to furnish if possible.

Auto Builders Seek Strip

Pittsburgh, Feb. 26.—The market for cold rolled strip steel remains unchanged. Mills are operating more heavily and inquiries are being made by manufacturers of pleasure automobiles for tonnage. Most of the business being done is either directly or indirectly for the government.

Low Output

Still Shown by Tin Plate Mills—Priority Order Ineffective

Pittsburgh, Feb. 26.—Operations of tin plate mills throughout the country are estimated at about 60 per cent of capacity. Restriction of output continues to be occasioned by a shortage of sheet bars and the traffic situation. Tin plate was recently put on the list of products given preferential shipment but was placed in the last class. It is reported but not verified that the railroad administration now has moved tin plate up to the third class. The large stocks stored have been little affected by the priority order and many mills still are suspended. Good-sized shipments have been started recently to the salmon and condensed milk trade in the west but some of them have been held up at Chicago. Not many eastern shipments are being made. A conference will be held Thursday in Washington with a representative of the railroad board with a view to having shipments expedited in both directions.

To Bring in Cuban Ore

Washington, Feb. 26.—Arrangements have been made with the war industries board and the shipping board for the immediate importation of 15,000 tons of low phosphorus ore from Cuba for smelting in eastern furnaces for the production of pig iron to go into an order for gun forgings placed to the account of the war department.

Implement Buying Active

Partial Priority to Agricultural Tool Industry Enables It to Get Bars More Freely—Rewritten Contract Matter Persists

Chicago, Feb. 26.—Agricultural implement makers are inquiring actively for soft steel bars, and inasmuch as this industry has received at least partial preference at the hands of the government, they will be given what they require as the need arises. Most of these buyers are being covered by the leading interest, which has had the bulk of this business in the past. Comparatively little other inquiry is being received for soft steel bars except such as the government is placing for its own purposes. Buying of bar iron is being done steadily in small tonnages and inquiry seems to be increasing. Some difficulty is being met by mills in obtaining sufficient fuel as bar-iron makers are not preferred coal buyers. Present bookings are practically all for spot delivery and mills have obligations running practically 60 days. Hard steel bars are not in much demand but implement manufacturers are taking some tonnage to fill in for soft bars which they are unable to obtain promptly enough for their purpose. These mills are running on small future bookings and some have not more than a fortnight's business before them.

Mills Catching Up

Pittsburgh, Feb. 26.—Demand for steel bars is fairly active and makers are behind on deliveries due to a curtailment of output. Operations have increased considerably, however, since the railroad situation improved and mills are making headway in catching up on orders, and some of them are now able to take additional bookings for domestic consumers for second half delivery. The government is taking good-sized tonnages of soft steel bars and there is also heavy demand for shell steel. Makers of iron bars are well committed on contracts, mostly for the government. It is understood they are not taking new business from domestic consumers.

Government Buys Many Bolts

Cleveland, Feb. 26.—Further renewed efforts of nut and bolt makers to induce the mills to rewrite to government prices old steel bar contracts taken at higher prices have proved equally as unsuccessful as former attempts. Requests along this line have been made to high steel officials. Some of these matters have been brought more to the front of late, owing to the placing of large orders for bolts by the government at the fixed prices in which local makers shared liberally. Some of these makers will fill their steel needs on this business by taking out the needed tonnage against old bar contracts which had been placed originally to cover commercial business. The 55,000,000 bolts for the quartermasters department still are unplaced. Heavy orders for automobile tractors have directed a large demand in such lines as bearings upon the manufacturers and some of the latter in northern Ohio now are doing double time. An inquiry for 500 tons of reinforcing bars for dam construction over the Miami river is current. New government inquiries of the past week have included several hundred tons of 16 to 23-inch dock spikes, and a considerable quantity of nickel and special bars for the navy.

Bolt Plants Ship Better

Pittsburgh, Feb. 26.—Makers of nuts, bolts and rivets report that shipments from their plants are being made more freely and steel bars are being received with much less difficulty than was the case recently. Business is brisk, but most of it is for the government either directly or indirectly. No large orders are said to have been taken by makers in this district during the past week.

Government Buys Shafting

Pittsburgh, Feb. 26.—Tonnages of cold rolled shafting continue to be taken by the government in fair-sized quantities. The domestic market is quiet.

Hoop Buying Light

Pittsburgh, Feb. 26.—Commercial requirements for hoop steel have shown a falling off and the principal buyer is the government. Makers are well sold up for several months ahead, and have lost considerable tonnage by reason of the shortage of steel. The market for bands is dull.

Stocks Are Depleted

Boston, Feb. 25.—Boston jobbers still report matters to be quiet in the structural end of the business, but that they are doing a good, everyday business in those lines essential to plants engaged on war orders. The activity in the latter is at the expense of warehouse stocks, for as yet there has been no appreciable improvement in the deliveries from the mills. Stocks of angles, beams and bars are considerably depleted, but dealers are hopeful that before long transportation conditions will have improved sufficiently for them to secure prompter deliveries on the orders they have placed.

Heavy Bookings

In Lap Weld Pipe From all Sources—Expect War Orders

Pittsburgh, Feb. 26.—Makers of iron and steel lap weld pipe report that the market has become active and bookings are rather heavy. Orders are being taken from railroads, oil country interests, jobbers, mines and mills. Deliveries on assorted lots for jobbers in carloads can be made promptly but on large requirements shipping terms provide a much longer time and in some cases are to be made at the convenience of the mills. Operations are considerably increased and tonnages being shipped have relieved conditions considerably. Some warehouses had become well filled with pipe and caused some producers either to close down altogether or to curtail production greatly.

Government Buying is Light

New York, Feb. 26.—Private inquiry for cast iron pipe continues to hold up well in the east, although few single large tonnages are involved. This demand is augmented by the further placement of small orders by the government. Perhaps the largest order to be placed recently by the government is that calling for 1000 tons of 8, 10 and 12-inch pipe for its new ammunition plant at Keesport, N. J., which went to the United States Cast Iron Pipe & Foundry Co. Considerable new business from the government is in prospect including the requirements of the explosive plants to be erected by the Du Pont interests and the Thompson-Starrett Co. There also is the $37,000,000 gasmaking plant to be constructed at Edgewood, N. J., and the various new munition plants and other projects which were outlined in Washington recently by the war department. As soon as the pipe specifications for these projects are definitely settled upon heavy buying is expected. This demand will be further increased by purchases for the government's housing program. Municipal work remains scarce. Buffalo has placed 1000 tons with

the United States Cast Iron Pipe & Foundry Co. Export business although active in inquiry has developed few orders. Prices appear firmer. Although they have been maintained generally at the government maximum there have been some concessions.

Some Cities Buy

Chicago, Feb. 26.—Somewhat better activity is noted in cast iron pipe for cities, although the tonnage on inquiry is nothing like that ordinarily entertained at this season. The United States Cast Iron Pipe & Foundry Co. is low bidder on 500 tons at Milwaukee and probably will be awarded the business. Bids will be opened March 2 at Manitowoc on 100 tons and March 5 at Saginaw, Mich., on 135 tons.

Better Operations

Shown by Wire Mills, But Labor Disorganization is Troublesome

Pittsburgh, Feb. 26.—Operations of wire mills continue to show much improvement since more steel and better transportation service became available. These factors, however, continues to be important obstacles in the way of satisfactory production and are aggravated by the disorganization of working forces since some of the men went to other occupations during the recently prolonged idleness of mills. Demand for wire and wire nails is fair and most makers are committed for the second half and in some cases have had to greatly defer shipments on contracts. Business being taken from domestic consumers as a general thing provides for delivery at the convenience of mills. Government requirements are said to be only moderate.

Bolt Wire Closed

Cleveland, Feb. 26.—Local boltmakers who participated in the recent distribution of a large bolt order for the engineers' depot have covered for the requirements of bolt wire for this business. This need was filled largely by drawing against old contracts for steel on makers' books, although some new material was bought. Operations of the American Steel & Wire Co. in this district continue to be restored gradually, but at present production does not exceed 75 per cent of steel capacity.

The western office of the Ohio Corrugating Co., of Warren, O., at 208 South La Salle street, Chicago, has been made selling agent for a line of steel drums for shipment of by-product liquids produced from coke oven gas.

Canada Gets Big Tonnage

American Government Understood to Have Assured 300,000 Tons of Plates and Other Forms For Ships—Production Drags

Buffalo, Feb. 26.—Inquiries on the part of Canadian shipbuilders for material, which were before the market recently have been withdrawn. The Canadian government has come to the rescue of the builders by negotiating directly with Washington for requirements estimated at 300,000 tons. The American government is understood to have guaranteed to procure this tonnage and export restrictions have been removed for the free passage of the material. A mill which is rolling plates for the Emergency Fleet corporation last week took on a small additional commitment.

Production at Low Ebb

Philadelphia, Feb. 25.—Output of plates by eastern Pennsylvania mills in no case appears to be above 50 per cent of capacity, and in some cases the precentage is a good deal less, and there seems to be no promise of any immediate improvement. Although coke and steam coal deliveries are better, shipments of gas coal continue as much delayed as at any time in recent months, and the supply is utterly insufficient to insure continuity of operations. In the meantime, demand shows an increase. Consumers all through the country are inquiring for large tonnages, but on these the mills are unable to quote. The only orders of size placed with eastern mills during the past week were from the Emergency Fleet corporation, and these constituted a fairly large total.

Car Shops at 70 Per Cent

Pittsburgh, Feb. 26.—No car orders were placed in this district during the past week. Builders are receiving sufficient supplies of plates and operations are at the rate of about 70 per cent of capacity. So far as known no plates are being offered in the open market and inquiries are not numerous.

Want Vessel Steel

Cleveland, Feb. 26.—Inquiries are appearing for the material which will be needed to restore and reinforce the approximately 10 or 15 lake vessels which are to be cut in two and shipped through the Welland canal for ocean service. It is estimated that probably 10,000 tons of material will be needed for this purpose. Buyers are finding it more difficult to get deliveries from the mills because of the crippling of output which the latter recently have sustained. Practically only war business is being entertained.

Award Much Ship Material

Chicago, Feb. 26.—Awards by the government of large tonnages for shipbuilding purposes continue to be made to all finished steel producers. Most of this tonnage recently has been for plain material to be furnished fabricating shops to go into the new style of ships now being erected at Atlantic coast and gulf points. Although this tonnage is given out in small lots, it aggregates enough to make a large tonnage both for mills and for the bridge shops which fabricate it. Some demand for plates

Car Buying

Practically at Standstill Pending Action at Washington

New York, Feb. 26.—Pending developments in Washington, the buying of cars for domestic use remains of small volume in the east. A few inquiries from private companies are noted but that is practically all. Included in inquiries from these sources are 50 special cars for the Phelps Dodge Co. and 75 tank cars for the Butterworth-Judson Corp. Of the 4500 cars of miscellaneous types, inquiries recently by the government for use of the American expeditionary forces in France, action on approximately 1000 cars, comprising an equal number of box and low side gondolas, is yet to be taken.

The railroad administration has placed 200 cars of miscellaneous types for the domestic use on American roads.

The Baldwin Locomotive Works last year manufactured 2748 locomotives valued at $36,455,574 and completed shell contracts valued at $21,000,000, which, with other work, brought total production to $98,263,865, according to President Alba Johnson in his annual report.

Buys Standard Spikes

Pittsburgh, Feb. 26.—The New York, New Haven & Hartford railroad has taken 2900 kegs of standard spikes from a manufacturer in this district, prompt delivery being made. Jobbers are actively seeking small spikes and

mills taking contracts are promising delivery in three to four months. Shipments have been held up by railroad embargoes. Inquiries for light rails are being made rather freely and while some mills are not making any offerings, others are able to make early shipment and are supplying tonnages from discard steel. The market for standard rails is quiet.

Structural Total Slumps

January Lettings Drop Away to 53 Per Cent From 114 Per Cent in December—Powder Buildings Up For Action

New York, Feb. 26.—Structural bookings dropped off heavily during January to 53 per cent of shop capacity, according to the regular monthly report of the Bridge Builders and Structural society. This compares with 121 per cent in December when bookings were the second largest in volume in the history of the society. In tons, it is equal to 95,400, a decline of 109,800 tons from the preceding month. Although bookings in January were comparatively light, considerable tonnage, chiefly for government account, was under consideration, as reflected by the temporary allotment of 2500 airplane shelters for the American expeditionary forces in France which was quietly made around the end of the month. These shelters originally called for 87,500 tons, but later revision of design raised this amount to approximately 100,000 tons. This business continues under negotiation. A comparative statement follows:

Month	Per cent	Approx. tonnage
January, 1918	53	95,400
December, 1917	121	205,200
November, 1917	77	138,600
October	61½	110,700
September	29	52,200
August	38	68,400
July	41½	74,400
June	47½	85,500
May	56½	102,000
April	61	110,000
March	68	122,000
February	59	106,000
January	61½	119,000
December, 1916	86	148,000
November	78	134,000
October	77	133,500
September	52½	99,400
August	64	112,600
July	47½	83,600
June	58	100,000
May	80	137,000

Demand in the eastern structural market during the past week has improved. The E. W. Bliss Co., which several weeks ago withdrew an inquiry for a 5000-ton addition has placed 2500 tons. A similar tonnage is expected to be awarded later.

Government Work Impends

Philadelphia, Feb. 25.—The structural market now is at the lowest ebb known so far as new business is concerned. Government work, in fact, comprises all that now is coming out. No action yet has developed with respect to the 2500 airplane shelters for erection in France, but it is believed awards will be made soon. Sales of plain shapes also are at a minimum.

Fabricating Market Dull

Pittsburgh, Feb. 26.—The fabricating market is dull. Most of the business being taken is for the government. Operations are somewhat heavier than they were recently and deliveries have shown slight improvement. The Pittsburgh Steel Car Co. is asking bids for its proposed plant at Greenville, Pa., requiring approximately 4500 tons.

Bridge Shops Filling Up

Chicago, Feb. 26.—Fabricating shops in the west find themselves in much better condition than at the beginning of the year, as the total of ship fabrication and other government work has given them much better bookings. Some shops which entered the year with comparatively little business ahead are now nearly filled up for several months and are unable to take more business except subject to delay. The government is placing structural material for four large powder plants, most of which has been awarded to eastern shops but part of which is being placed in the west.

CONTRACTS PLACED

Submarine boat plant for the Ford Motor Co., Detroit, 6000 tons, to the American Bridge Co.

Bank building, Winston-Salem, N. C., 300 tons, to Barber & Ross.

Building in Tennessee, for Tennessee Valley Iron & Railroad Co., 400 tons, to Hansell & Elcock, Chicago.

Explosive plant in West Virginia, 1100 tons, placed with independent shop by the Thompson-Starrett Co.

Government shop in Philadelphia, 2200 tons, general contract to McClasky & Bahls.

Plant extension for E. W. Bliss Co., Brooklyn, 2500 tons, to Hedden Iron Construction Company.

Addition to Western Electric Co.'s Hawthorne plant, near Chicago, 2710 tons, to American Bridge Co.

Elks club, Jersey City, 500 tons, to Hedden Iron Construction Co.

Building for T. Eaton, Ltd., Toronto, 6000 tons plain material to Bethlehem Steel Co.; fabrication Dominion Bridge Co.

Telephone building, Washington, 1500 tons, to Bethlehem Steel Co.

CONTRACTS PENDING

Dam construction, Miami river, Miami, O., 500 tons reinforcing bars, bids to be taken March 1.

Additions to Hawthorne plant, buildings Nos. 24, 26 and 27, for the Western Electric Co., Chicago, 2710 tons, to American Bridge Company.

Alderpoint bridge over Eel river, Alderpoint, Cal., Humboldt county, Cal., 183 tons, to Pacific Rolling Mill Co.

Warehouses for Quartermasters department, 2300 tons, bids being taken.

Plant at Greenville, Pa., for the Pittsburgh Steel Car Co., 4500 tons. Bids asked.

Sheet Demand is Unfilled

Mills Unable to Supply Heavy Tonnages Wanted For First Quarter —Eastern Contracts Provide For Cancellation

Youngstown, O., Feb. 27.—Inquiry for all grades of sheets among the mills in this district is exceedingly heavy. The tonnages wanted are in nearly every case for first quarter delivery. The mills are in no condition to sell on this basis. Consequently vast tonnages are unsatisfied and buyers are going into such districts as can supply their immediate needs. A notice to the effect that western freight rates will be advanced March 15 has stimulated inquiries to such an extent that they are pouring in daily. Western buyers who placed tonnages with the valley mills sometime ago are clamoring for the mills to make shipments before the freight rates advance. Sales managers state they are dispatching western shipments faster than they have been for some time. The railroads are supplying box cars at the government's request so that a large supply of these cars will be available for grain shipments east. It now develops that the 12,000 tons of black and galvanized inquired for some time ago by the government, have been placed with fabricators with directions where to allot the sheets in multiple tonnages. The valley mills expect to share in these allotments.

Second Quarter Contracting

Philadelphia, Feb. 25.—Considerable second quarter contracting has been done by the leading eastern maker of blue annealed. These contracts are practically nothing more than reserva-

tions, as they allow either the buyer or the seller to cancel in case the government establishes a price that is unsatisfactory. Government orders for sheets are being placed almost daily and they constitute good-sized totals. Some government tonnage has been placed for shipment as far ahead as next July. Middle western makers continue to offer black, blue annealed and galvanized sheets for shipment in two to three months.

Sheet Shortage Harasses Mills

Pittsburgh, Feb. 26.—Shortage of sheet bars and of cars continue to cause sheet mills to operate at low schedules, which probably do not exceed 50 per cent of capacity. Producers are making diligent efforts to obtain increased sheet bar tonnage but are meeting with only moderate success. The government is still buying sheets in good volume and domestic consumers are asking for tonnages which have been allotted. There is a heavy demand for galvanized sheets for second quarter. It is generally conceded that the output of all grades is not going to be sufficient to take care of requirements. A number of makers have been forced to defer shipments on contracts.

Little Spiegel

Available for First Half and Prices Stiffen—Ferro is Strong

New York, Feb. 26.—Spiegeleisen rapidly is becoming more difficult to buy for first half delivery. Most of the makers no longer are able to quote on anything prior to July 1. As a result, the market is exceedingly strong and none of the makers are quoting less than $3 per unit at the furnace, equivalent to $60 for 20 per cent metal. Inquiry for spiegeleisen has broadened out to a total of 5000 to 6000 tons. One consumer wants 3000 tons for second and third quarters. It is understood that both the Whitaker-Glessner Co. and the Inland Steel Co. have closed their recent inquiries.

Inquiries for small tonnages of spot ferromanganese are more numerous. At the same time, spot delivery is getting more difficult to obtain. Inquiries for forward delivery involve some 1500 to 2000 tons. While there has been an improvement in the immediate supply of ore, the maintenance of the supply in the future constantly is viewed with greater apprehension. As a result, ferromanganese market is strong and no quotations of less than $250, delivered, are heard.

Demand for ferrochrome is quiet. Spot may be quoted at 35 to 45 cents per pound, furnace and contracts at 31 to 34 cents. Demand for ferrotungsten also is quiet. The market is at $2.20 to $2.25 per pound, furnace for 70 per cent, and $2.35 to $2.40 for 80 per cent.

Ferrosilicon in Demand

Pittsburgh, Feb. 26.—Fairly brisk demand exists for 50 per cent bessemer ferrosilicon and some makers are asking from $15 to $25 a ton more for prompt shipment than for second quarter which they quote at from $170 to $175, delivered. For second half these producers ask from $20 to $25 less than for second quarter. A recent inquiry for 500 tons for the remainder of the year was not taken by sellers in this district so far as known. Demand for limited lots of ferromanganese continues and where quotations are made the price is $250, delivered.

Now Ready to Sell Iron Ore

Sellers of Lake Superior Ore Are Receiving New Contracts—Provisions for Price Adjustment—Best Ores Reserved

Cleveland, Feb. 26.—Sales of Lake Superior iron ore for 1918 delivery will be made within the next few days. New contracts will be printed and delivered to the ore sellers within a day or two and the ore selling movement will open immediately afterward.

The contract as finally approved by the ore sellers carries this year an additional clause providing for a price adjustment to meet any future change authorized by the government. This rider in full is as follows:

The price named in the contract, dated ..... of which this rider forms a part, is named in accordance with the base price directed by the war industries board of the United States government and, so far as applicable to iron ore shipped from the mines thereunder after March 31, 1918, is named upon the agreement that in case any authorized agency of the United States government shall increase or decrease the said base price, then the price named in said contract shall be likewise changed to conform to the maximum price permitted by such authorized government agency at the time of such shipment.

This clause is designed by the ore trade to meet the peculiar conditions arising from the action of the government late in December, in requesting that contracts based on the Jan. 1 scale of prices be not extended for deliveries beyond March 31. The ore business conducted as it has been, on a 12-month basis, was upset by this ruling. As a result, the selling movement has been delayed until now.

The iron and steel committee of the American Iron and Steel institute has had under consideration a plan to secure from the war industries board a special ruling sanctioning the carrying on of the ore business upon the 12-month basis. This committee, it is understood, will continue its efforts in the hope that when the April 1 price scale is announced, the ore prices set will be definitely understood as operative throughout the 1918 season unless affected by subsequent developments now unforeseen.

The new ore contract contains several additional changes, largely those including war and insurrections among the unavoidable causes of delay in delivery for which the seller is relieved of responsibility.

The selling movement now will be active but in a great many cases will be merely the formal ratification of reservations made some time ago. Most of the choice Lake Superior ores have been reserved but a considerable tonnage of ore remains to be disposed of.

Despite the great delay in making definite sales, the ore producers have generally pushed mining operations this winter in order to insure a sufficient tonnage being available during the 1918 navigation season.

A restrictive factor in ore production has gained importance during the past few weeks. This is the unsatisfactory labor situation in the Lake Superior district. The shortage of labor has increased somewhat but the most disturbing element has been the growing tendency of the workmen to work only part time. The underground mines are particularly affected, one mine for instance being forced this week to cut in half its estimate of 1918 production. Last year when the labor shortage in the large industrial centers was growing more acute, the mining districts suffered little loss in output from any scarcity of workmen. Present disturbing conditions in the mining districts thus introduce a new factor into the question of insuring a sufficient ore supply this year.

The sharp decline in pig iron production, however, as emphasized on page 530, will sharply curtail the tonnage of Lake Superior ore required this year. Labor developments to date, therefore, are not taken to indicate any prospects of the ore mines being unable to forward as heavy a tonnage as will be required.

Iron and Steel Are Millions Short

Heavy Losses of Production in Recent Months Intensify Problem of Supply For All the Country's Needs—Large Tonnage of Iron Business Deferred From 1917 —Growing Government Allocations Complicate Situation

TWO months or more of the most demoralizing operating conditions in the history of the industry have cut deeply into the production of iron and steel. In pig iron this has amounted to from 1,500,000 to 2,000,000 tons; in steel it has been equally as great. The total may run much greater, since normal conditions still are far from being restored.

The severity of the recent curtailment of plant activity as the result of unprecedented weather, traffic and fuel obstacles, is forcibly expressed by the statistics of output. In November, according to the monthly compiled data of THE IRON TRADE REVIEW, furnaces were producing coke and anthracite pig iron at the rate of 38,400,000 tons for a twelve-month period; in December the annual rate had dropped to 33,800,000 tons. January, when operations reached the climax of dislocation, showed a precipitate further decline to 28,800,000 tons yearly. In November and December, 1916, and in January, 1917, production was at the respective annual rates of 39,800,000, 38,200,000 and 27,900,000 tons. The country's output of coke and anthracite pig iron for the full calendar year of 1917 was 38,150,000 tons. In January, therefore, the furnaces were running on the basis of a loss of 9,350,000 tons over last year.

Bessemer and open-hearth plants in November were making steel at the rate of about 43,200,000 tons of ingots, based upon reports of the American Iron and Steel institute showing returns from slightly more than 88 per cent of capacity. December shows this total shrunk to about 37,200,000 tons and January to 30,000,000 tons. The ingot output of the country in 1917 was approximately 42,200,000 tons. The January production, consequently, was at the rate of 12,200,000 tons less than the calendar year of 1917.

What is likely to be the results of this far-reaching and irreparable loss of iron and steel, especially at the time when the war and the conditions it has created, are demanding every ton that the works of this country can produce?

The December-February stoppage output cannot be recovered. Even were the works to be favored for the remainder of 1918 with the most perfect operating conditions, which the inadequacy of transportation facilities, measured by present traffic demands, forbids, this loss cannot be made good. In 1917, at least two-thirds of the year were passed with a reasonably normal operating situation. This was before the requirements of the ever-growing war machine were choking the railroads, or the prompt dispatch of ships had become a major problem. In 1916, the industry ran a reasonably normal course, and was unhampered by the congestion incident to a domestic war situation, since the country was at peace. It was in this year that the industry achieved its highest level of production. Even if the operating conditions of 1916 and for the greater part of 1917 could be restored quickly, it is improbable that in the present war situation sufficient additional output could be forced to make up for the lost tonnage of the past two or three months. Therefore it must be regarded that the industry is laboring under a present and probable permanent shortage—considering only the last few months—in excess of 1,500,000 tons of both iron and steel. The year 1918 is moving forward under this handicap.

Since steel is the real basis for all war preparation and prosecution, it is a fundamental proposition that the government needs must and will be supplied. This means not only the direct and indirect requirements of this country, but also those of its allies. What these requirements will amount to in tons during the next 12 months is an open question. There is no way of definitely ascertaining what the government and its allies will call for from the mills and furnaces. The indirect tonnage especially does not admit of estimate, but each day its ramifications extend further and further through every strata of national business. The entire war tonnage is tied up inseparably with the question of ships. How many ships will be available to transport steel and its products and how many new vessels the country will be able to build largely will determine this unknown quantity. The supply of ships is a variable proposition, depending as far as new construction goes upon conditions in the labor and land transportation fields, and also in a large measure upon the fortune of war itself.

In the matter of pig iron, more so than in steel, there is cause for grave contemplation. Already there have been unmistakable signs and enough concrete cases to prove that the overwhelming pressure of demand, long-continued, has become greatly intensified by the recent interruptions of furnace activity. One important effect has been the carrying past the prescribed date of delivery of quotas of sales contracts, by practically all furnaces. This means a stringing out of this business and a displacement of future tonnage which had not been bargained on. And this promises to be a factor that will exert much influence in the matter of satisfying all consumptive needs. It is estimated from reliable and definite data that the merchant furnaces, particularly in the north, carried over Jan. 1, on the average from 15 to 20 per cent of the tonnage booked for shipment in the last half of 1917. In one district alone, this has amounted to 100,000 tons. Individual companies report notwithstanding the pursuance of very conservative sales policies last year, they found themselves on Jan. 1 with the greatest deferred tonnage in their history. It may be stated with approximate accuracy that fully 500,000 to 700,000 tons of merchant business accepted for 1917 delivery must come out of 1918 production. It is manifest that because of the shattered operations of the furnaces in January and in most of February, the net postponed tonnage has not been reduced. In all probability it has been further increased. Stocks have been so lean that little tonnage except that of current make has been shipped. Another further load upon the merchant furnace capacity is that non-merchant producers will attempt to make up losses in output by purchases in the open market.

There are some compensating conditions which have accompanied the unprecedented backing up of old business. These arose from the fact that the demoralization that attended production in recent months, to a large extent also curtailed consumption, since plants of all descriptions were suspended. Furthermore, the fuelless days benefited the

furnaces, since, as a class, they were exempted. As a matter of fact, however, because of the delay in fuel reaching them, this advantage was more theoretical than actual.

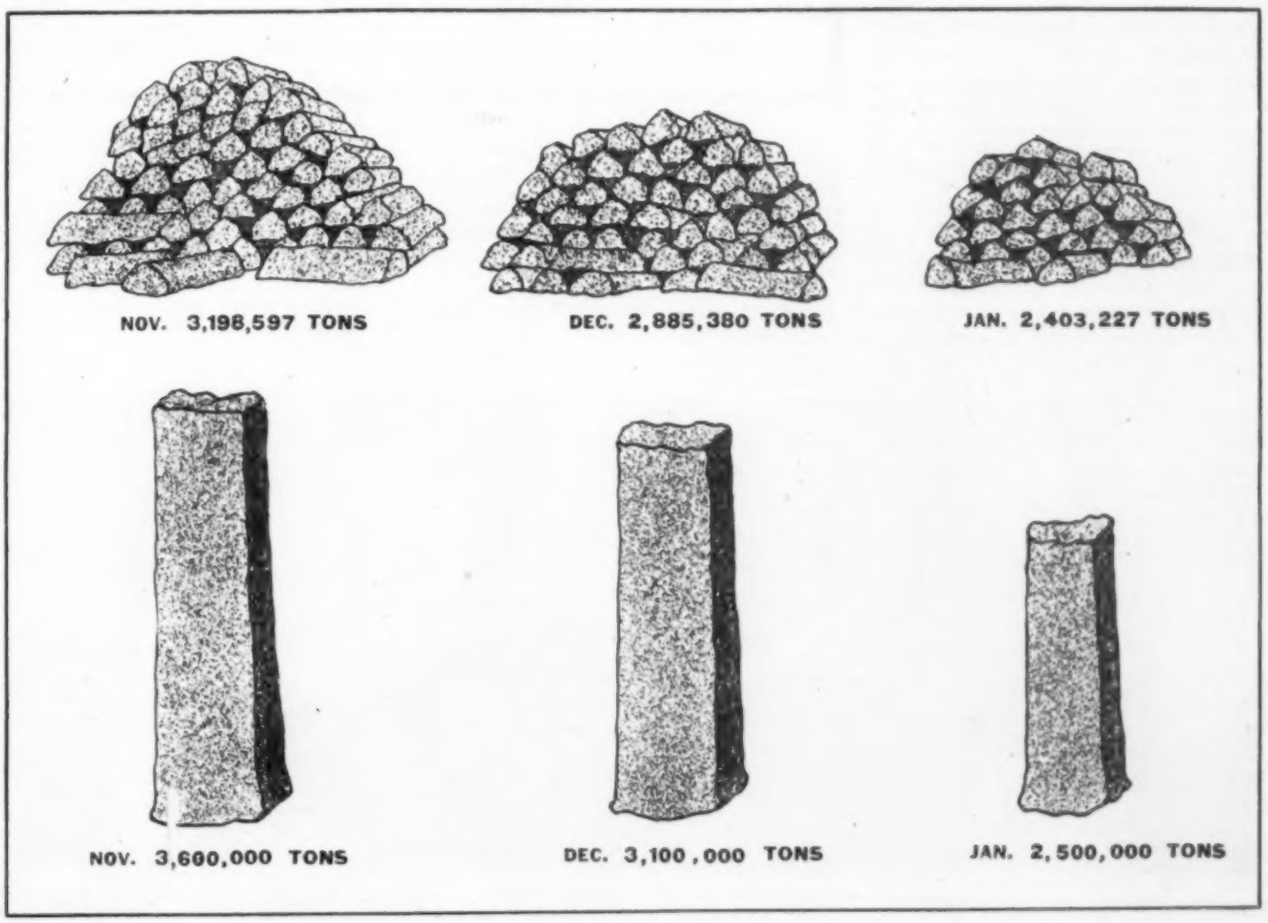
As matters now stand, the furnaces find themselves with much heavier obligations and with far less production for 1918 delivery than they had counted on. On top of this, many of them, yielding to the pressure of buyers, have booked heavily for the last half of this year; in fact, not a few of them already find themselves sold up within a small margin of their normal output for the final six months, and they are obliged to reject thousands of tons of additional business. This is especially true of basic, where a huge requirement still is to be covered. It has been estimated by prominent sellers that they readily could dispose of 500,000 tons of last-half iron of various grades if this were available.

Further complicating the whole problem of supply and demand, the government is projecting into the market weekly thousands of tons of new and insistent demand based on war business for which priority is claimed and secured. This is being allocated to various furnaces and in most cases it is displacing former orders placed by consumers in the routine fashion. From all indications, these allocations will grow steadily. They are resulting not only in interrupting regular deliveries, but have caused a switching of grades in furnace output, thereby blocking the needs of consumers who had been depending on these stacks for their supplies of a different character.

The pig iron situation, in consequence of all these conditions is upset as never before, not only by a serious loss of production, but by abnormal distribution. That a tremendous shortage of iron and a radical realignment of industrial operations will be produced some time after July of the present year is becoming the common belief of those who have carefully analyzed the situation. Those engaged in the non-war lines of manufacture by reason of the character of their business will be affected most severely.

The steel side of the problem is less evident as to its future results because of its greater flexibility. This is due to the fact that finishing mill capacity is in excess of that of steel works. Whatever form the heaviest war needs of the government may take relatively, in the way of finished material, will determine where the dislocation to outside business will be most sweeping. In just what lines the largest percentage of mill capacity will be absorbed for war purposes is not yet clearly established, although it may be assumed from developments to date, plate and shell bar and billet plants will be called upon in the largest degree. Where finishing mill capacity is most pressed by war demands, the diversion of ingot tonnage from the lines of normal division will be greatest. Inasmuch as the industry starts the year with a shortage of 1,500,000 tons or more of ingots which is beyond recovery, the readjustments of rolling schedules under war distribution will make the total effect upon other business all the more severe. One source of possible equalization for this situation as against conditions in 1917 and 1916 is the tighter rein that has been placed on exports of iron and steel. As shortages grow at home, they are likely to have the effect of restricting the licensing of foreign shipments. With an export tonnage of over 6,000,000 during the past two years, this is an important factor.

The threatened shortage of pig iron is intimately related to that of steel. Since war needs largely are in terms of steel rather than of direct pig iron, the tonnage of the former material that will be required will determine what lines pig iron production and government influence will follow.



HOW IRON AND STEEL PRODUCTION HAS SHRUNK IN RECENT MONTHS

Await War Buying Changes

Overman Bill Will Allow President to Delegate Board Powers—Will Stettinius Receive Greater Authority?

WASHINGTON, Feb. 26.—The war department has adopted the policy of the navy in favoring publicity relating to contracts and military purchases. This step follows developments in the army, concerning purchases of uniforms and overcoats, which brought dangers of secret contracts.

The department's announcement says:

"The secretary of war directs that hereafter the practice be adopted of freely making public the names of all contractors for military supplies."

This supplements the following announced policy of the committee in supplies which is said to have caused the so-called purchasing scandal:

"It is our judgment that the government's business should be done on the same plane as that of the private concern, and they do not advertise their doings either before or after the fact. It is absolutely impossible to do a good merchandise job upon the former publicity methods."

Against this self-obliterated policy has been the navy's:

"It has been found unnecessary to throw any veil of secrecy around the navy's business, whereas out and out publicity insures in advance a deal square and true to each bidder, present or absent."

What Stettinius Will Do

This policy and the hints given out from the office of Secretary Baker that Edward R. Stettinius will be made second assistant secretary with supervision of all "industrial and commercial" activities of the department are suggestive of the department's solutions of its internal troubles and the answer to the paramount question, "What is Stettinius to do?" But that still does not solve the problem of coordinating the purchases for the army, the navy, the shipping board and the allies. And there the issue hangs.

When Mr. Stettinius was brought to Washington and made "surveyor general of all army purchases", the possibility arose that he would be named "munitions director", or, at least, chairman of the war industries board, with broad powers. Where those powers were to come from was not definite, but now it is seen they would be given him by the President under the broad authority to be authorized in the Overman bill.

Now Mr. Baker says his bill in congress for two additional assistant secretaries will enable him to appoint one man for "industrial and commercial" duties, and another for non-military activities. This latter post is believed awaiting Raymond B. Fosdick who has been in charge of training camp affairs. Benedict R. Crowell, present assistant secretary, will become first assistant and in effect Baker's understudy.

Incorporate Subsidiaries

Birmingham, Ala., Feb. 26.—Filing of incorporation papers for four subsidiaries of the Tennessee Coal, Iron & Railroad Co., establishes an identity for the developments that are being placed at Fairfield, adjacent to Ensley in the Birmingham district and for the shipbuilding plant at Mobile. On the latter the Steel corporation will spend upward of $30,000,000. The capitalization of each corporation has been placed at $50,000. G. G. Crawford, president of the Tennessee company, is president of all four subsidiaries, with H. C. Ryding as vice president, and L. T. Beecher, secretary-treasurer. The Fairfield Steel Co. will cover the Fairfied development. The papers give the right to construct and acquire steelmaking plants, shipbuilding, and to produce steel, coal and coke, etc. The Chickasaw Shipbuilding Co. will operate the shipbuilding plant being put in at Mobile.

Sell Foundry Iron

Pittsburgh, Feb. 27. (by wire).—Sales aggregating approximately 25,000 tons of foundry iron have been made during the last few days and 15,000 tons more are under negotiation by a furnace interest for last half delivery. With commitments already made, this will take the entire output of this furnace for the delivery named.

The Non-Ferrous Metals

Copper **Lead** **Spelter** **Tin**

New York, Feb. 26.—The metal markets have been duller the past week if anything, than at any other time this year. Prices have changed but little and developments have been few and far between. Producers of grade "A" spelter, sheet zinc and zinc plates, have received formal notification of the new fixed prices agreed upon by producers and the war industries board and approved by President Wilson. These prices are as follows: High grade spelter 12c, f. o. b. St. Louis; sheet zinc 15c f. o. b. mills; zinc plates 14c f. o. b. mills. Regular extras and discounts will be allowed.

The fixing of these prices has had no effect upon the market for prime western and brass special grades, for which there has been little commercial demand. There has been so little call for brass special that in many cases sellers have been shipping this grade on prime western orders in order to dispose of it although in the past brass special has commanded a premium of ½c and more over prime western. Prime western quotations follow: Prompt, February, March, April shipment, 7.70c to 7.75c, St. Louis.

Traffic conditions continue to handicap the movement of lead from the west with consequent scarcity of supplies in the east. The American Smelting & Refining Co. today advanced its price $5 a ton to 7.25c, New York, per pound. Spot lead has been commanding a premium of about ¼c. Outside sellers have been quoting on the same basis as the American Smelting & Refining Co., and advanced today with the leading interest.

The tin scarcity is as pronounced as ever and the market situation presents many complex tangles which are keeping both buyers and sellers in the hot bed of uncertainty. Small lots of spot Straits have been sold as high as 99c here this week, while spot Chinese 99 per cent and spot A. S. & R. 99 per cent grades have sold at 85c New York.

Copper distribution is proceeding satisfactorily under the fixed price schedules of 23.50c for carloads and 24.67½c for less than carloads. Production is steadily being increased and no complaint is heard of the scarcity of copper.

Due to the transportation troubles, spot aluminum is commanding considerable premium over the regular quoted price of the Aluminum Company of America. This interest's true price is 38c but as high as 40c is being paid by consumers for metal out of stock. Although it announced sometime ago that the war industries board was to meet with representatives of the leading aluminum interests to fix a price, this meeting was postponed and no action has yet been taken. Consequently, the price of the producer to the government remains 27c and to the general trade 38c. The producer's contract price on sheets is 46c, while in the outside market spot and contract sheets are quoted 55c to 60c. Exceedingly little inquiry is noted for aluminum, except for government work.

There have been some attempts to stir up interest in the antimony market but these have not been productive of much result from the market standpoint. Plenty of antimony is being held in New York warehouses and the metal is available at 13.75c duty paid, New York.

How Heavy Structures Are Moved

How a Blast Furnace Weighing 500 Tons Was Lifted and Realigned—Moving Ore Unloaders, Car Dumpers, Standpipes, Office Buildings, Storage Tanks, etc., to Other Locations With Ease

OWING to the unprecented demand for iron and steel products in the past few years vast extensions and changes have been made necessary at most of the plants to increase their output and insure maximum economy and efficiency. Some of these alterations taxed the best ingenuity of engineers and contractors. Where adjoining ground space was available the problem was not a difficult one, but in many cases where space was lacking, every foot of ground had to be utilized and the proposition assumed a more difficult aspect. When originally these plants were erected the grouping and arrangement of the various buildings and other structures were usually constructed to meet the normal demand for their particular products, but the present unusual conditions were entirely unexpected and no preparation had been made to meet them. This brought into more activity than ever before the services of contractors who make a specialty of moving, raising or lowering heavy structures and objects.

The possibilities in this particular line were not generally recognized, with the result that in many instances buildings or other structures were dismantled and re-erected in close proximity to present sites, so as to make room for the additional work. This caused much inconvenience, a great outlay of money and consumed much valuable time. It is true that in some cases this was the only practical method, but in many others if an expert in this particular business had been consulted, perhaps, a more advantageous and satisfactory solution would have resulted.

The John Eichleay Jr. Co., Pittsburgh, has made a specialty of this line of work with exceptional success. Its activities have extended over a considerable territory, as far east as New York, to the west as far as Milwaukee, south to Goldsboro, N. C., and north to Buffalo. Performances of this company at iron and steel plants, as well as in connection with other operations throw an interesting light on what has been and can be done in the way of changing, enlarging or moving industrial or other works. In each of the following cases cited the Eichleay Company was the contractor.

Blast Furnace Aligned

The Struthers Furnace Co., Struthers, O., found that its furnace, together with the skip, downcomer and dust catcher, was gradually moving out of plumb owing to the cracking and spreading of the foundation. The cracks also permitted the escape of the hot metal. The mantle of the furnace was shored up with 15-inch steel I-beams. These were supported on eight wood bents which consisted of 8 x 16-inch timbers. Under these bents 100 screw jacks were placed on cribbing built up a few feet from the ground. The entire furnace, skip, downcomer and dust catcher were then jacked up sufficiently so as to free the cast iron columns from the base plates. The latter were then removed and the salamander, which had formed in the hearth, was dynamited out. The old foundations were removed and new ones built. The columns thus held suspended were then easily lined up and the furnace again lowered to a new foundation. The weight was approximately 500 tons.

The Jones & Laughlin Steel Co., Pittsburgh, found it necessary to erect additional open-hearth furnaces adjoining the old ones at the Soho works. To make the old and new superstructures symmetrical it was nesessary to raise the roof of the old building to the proposed elevation of the new one. To dismantle, extend the columns and reconstruct the roof meant a serious inconvenience. Not only would furnace operations have been interfered with but the workmen and the furnaces would have been exposed to all sorts of disagreeable weather, the work being

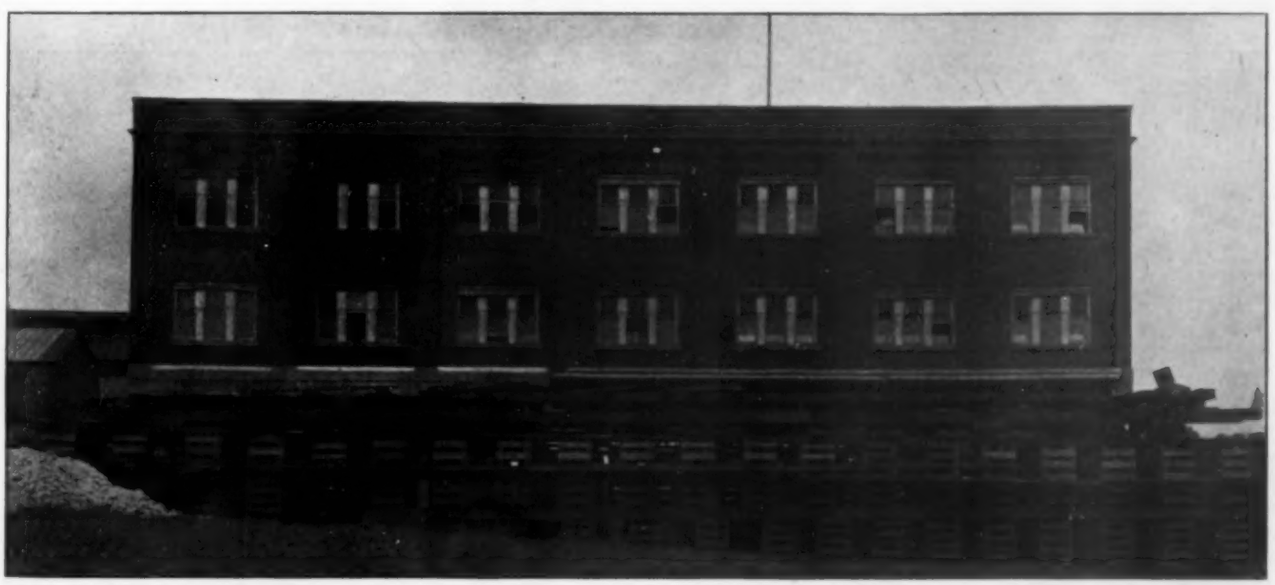


FIG. 1—A 2-STORY BRICK OFFICE BUILDING, 48 x 100 FEET, WHICH WAS MOVED 1100 FEET WITHOUT INTERRUPTING THE WATER, GAS, SEWER OR ELECTRIC CONNECTIONS

undertaken during the winter months. To escape all these drawbacks and to avoid shutting down the plant the entire roof, approximately 125 x 250 feet, was raised 6 feet with screw jacks and the steel columns spliced and extended. While this work was being done the furnaces and cranes were operated as usual. Special provisions were made to guard against any high winds. The furnace stacks, which extended about 75 feet above the roof, were braced so they would not be overthrown while the roof was being raised. The time required for this work was comparatively short compared with other methods that might have been used. Another roof over a mill building, 145 x 212 feet, for the same company was raised 10 feet.

Car Dumper Moved Successfully

A most interesting engineering feat was accomplished in Cleveland for the Erie railroad on account of the high-level Detroit-Superior viaduct over the Cuyahoga river. It was necessary to move a Hulett car dumper 214 feet up stream. Proposals from three firms were received for moving the dumper, and all but one contemplated its dismembering at the old site and its reconstruction at the new site. One contemplated moving the dumper, engines, boilers, boiler stack, engine houses and coal pockets as a single unit. Time proved to be lacking for any but the latter method. This method was unprecedented so far as is know, but after careful investigation relative to its possibility, the contract was awarded to the Eichleay company.

Many difficulties were experienced. The car dumper with the pan elevated is 116 feet high, and the boiler stack 111 feet high. The superstructure is only 38½ feet wide between front and rear columns and 56 feet long between upstream and downstream columns. The weight on the front columns is, with the pan elevated and the car cradle suspended, about 250 tons, while the weight on the

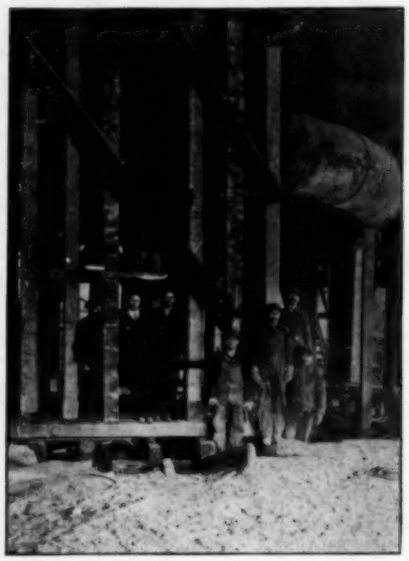


FIG. 2—RAISING A BLAST FURNACE WEIGHING 500 TONS

rear columns is only about 80 tons. The engines and machinery weigh about 140 tons and the boilers and their brickwork encasement about 200 tons. These together with the coal pockets, the engine houses and the necessary supports for moving made a structure practically 40 feet wide, 108 feet long and 116 feet high weighing 800 tons which had to be moved 214 feet. For 98 feet of this distance the structure was moved over a platform dock, built in 1910-11. This platform, 28 feet wide, was supported by transverse pile bents placed 6 feet, center to center, each bent consisting of five vertical and three batter piles. The material in the rear of the dock is hard clay.

To distribute the load evenly each vertical pile would have to carry about 9 tons, a load well within its power; and, the batter piles would have to keep the weight on the clay so as to prevent the dock from overturning. The method of procedure was as follows:

Excess Weight Counteracted

The two front columns were caught up by means of four 24-inch, 80-pound I-beams. These were 16 feet long and were placed parallel to the center line of the machine or transversely with the dock line. The lower flanges of the I-beams were placed under the bed plate of the columns and the upper flanges were cut to fit close to the columns. Each pair of beams was clamped to the column with 1-inch bolts. The front, center and rear columns were caught up by 12 x 12-inch timbers lashed on each side of the columns and projecting beyond the column lines. The engines and machinery were caught up on a system of cross bracing, composed of 12 x 12-inch timbers, which were connected with and braced to the column supports to form a single grillage under the entire structure. This threw the weight to the rear of the structure and counteracted the excess weight on the front columns.

The brick work of the three Stirling boilers was held in place by steel I-beams and the boilers then were

FIG. 3—AN ORE UNLOADER IN TILTING POSITION CAUSED BY THE SUDDEN FAILURE OF THE DOCK PILING. THIS APPARATUS WAS MOVED SUCCESSFULLY 400 FEET

jacked up enough to get timbers under them. The timbers were then connected to the main grillage. The coal pockets were also jacked up and their supporting timbers were made a part of the main grillage, which was thoroughly braced to prevent shifting or distortion. The whole system was then elevated up a distance of 35 inches, sufficient to clear all foundation bolts, the front columns being raised 6 inches higher than the rear to throw the center of gravity back from the front of the structure. Under the front and heaviest section of the grillage, longitudinally of the structure, several 12-inch, 31½-pound I-beams were placed and acted as bearings for the rollers. In front of and under the coal pockets several 12 x 12-inch timbers were used as top bearings for the rollers and under the remainder of the grillage at the center and rear, longitudinal timbers were used as top roller bearings.

Cribs for the roller runways were placed at the proper height on both the old and new foundations. On the dock platform cribs were also built high enough over each pile-bent to engage the bottoms of several 20-inch 65-pound I-beams. The latter were 30 feet long and were placed over each bent transversely with the dock, the front end of them resting on the front and high piles of the dock. The beams which extended across the dock and reached under the middle line of roller bearings, and were braced to prevent shifting or overturning. Crib work was placed under the rear line of roller bearings, high enough to bring the 12 x 12-inch transverse timbers level with the tops of the transverse I-beams.

Placing the Roller Runways

On top of the transverse I-beams under the front row of columns and roller bearings, several 10-inch, 25-pound I-beams were placed. These extended the full length of the dock and rested on the old and new foundations. They were used for roller runways. Cribbing was placed on top of the transverse I-beams and 12 x 12-inch timbers. The 6 x 8-inch oak runways for the middle and rear bearings were installed on this cribbing. On top of all runways 1-inch surfaced oak planks were placed to diminish friction. About 350 wooden rollers, 8 x 48 inches, were placed on top of these planks. Two hundred and thirty screw jacks were required to raise the structure, which was done in 2½ days.

The motive power consisted of two winches, with a team of horses hitched to each. A cable with two blocks was fastened to each winch. The cables were rigged five and five in turn and attached to the grillage on which the car dumper rested. After being moved to its destination the structure was again set on screw jacks and lowered to the previously prepared concrete foundation where it engaged the several hundred anchor bolts perfectly.

The Central Steel Co., Massillon, O., wished to extend its plant to meet the increased demand for its products, but a new 2-story brick and reinforced concrete office building, 100 x 48 feet, was so situated that it was necessary to remove it to a new site about 1100 feet distant. On account of the size and weight of the building it was planned to move it intact. The Eichleay company was awarded the contract. The building was moved 400 feet, lowered about 15 feet, given a quarter turn, moved again 700 feet and set on new foundations without interrupting the office work or affecting the water, gas, sewer and electrical connections. Ingress and egress to and from the building were maintained during the entire progress made on the work.

An exceedingly delicate job was successfully executed for the Detroit Iron & Steel Co., Detroit. Two ore conveyors of the old fashioned type were used to convey the ore to the trestle bins. The dock on which the conveyors operated was built on wood piling. A 21-foot section of the dock upon which the conveyors were standing slipped into the river and caused one conveyor to tilt at a dangerous angle. The operating end of the conveyor, 32 x 32 feet and 50 feet high, including the operating machine, weighed approximately 400 tons. If the dock movement had continued the conveyor probably would have collapsed. This would have resulted in a handicap to the operation of the furnaces and an enormous loss of money. There was one chance in a hundred of saving the conveyor. However, it was undertaken to move it to the solid portion of the dock. The apparatus was jacked up, made level and plumb, moved a distance of 400 feet, and was ready for operation within three weeks after the slipping occurred. Precaution was taken to keep the bridge, which was 175 feet long, from becoming de-

FIG. 4—A CAR DUMPER WHICH WEIGHS 800 TONS AND WAS MOVED 214 FEET

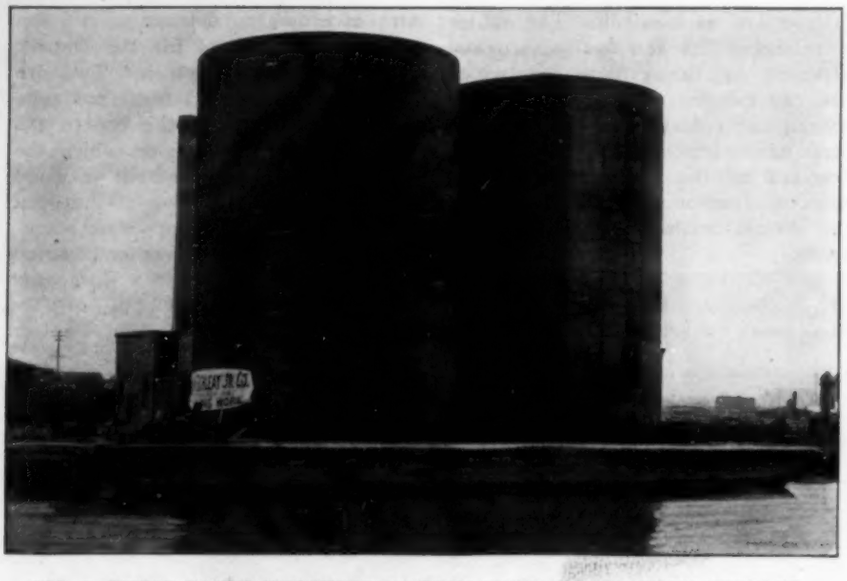


FIG. 5—THESE TANKS WEIGHING 200 TONS WERE MOVED FROM CHICAGO TO MILWAUKEE, A DISTANCE OF 88 MILES

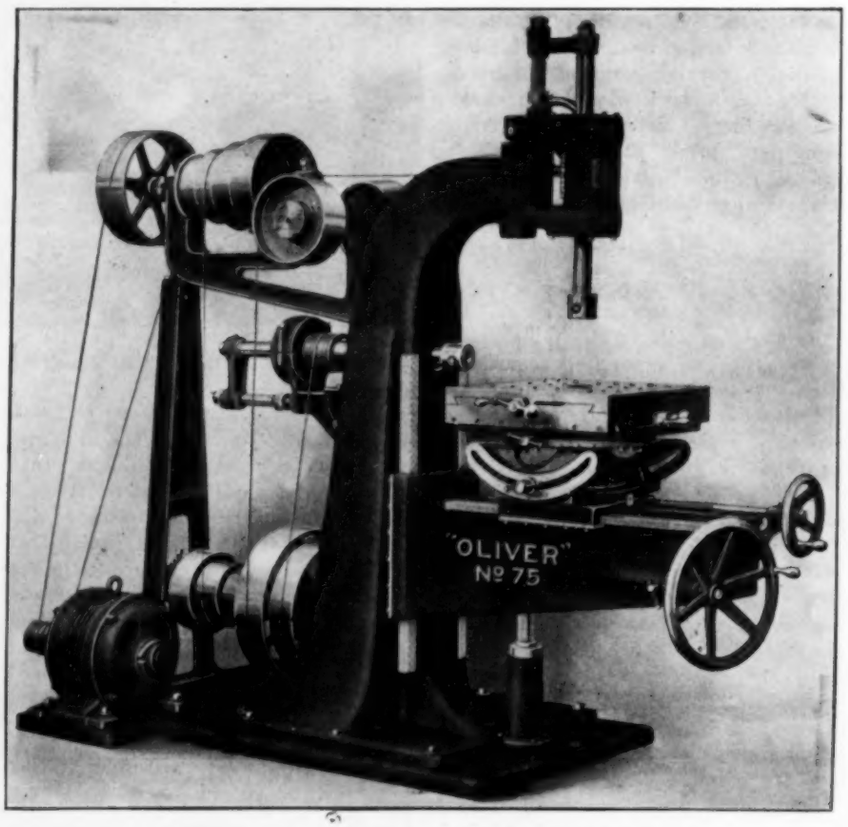
tached from the main superstructure. This was avoided by means of wire rope and steamboat ratchets.

A most unusual contract was undertaken for Armour & Co., Chicago. Two steel grain tanks, 40 feet in diameter and 80 feet high, weighing about 100 tons each, were to be taken from Chicago to Milwaukee to be utilized there for storage purposes. As only 55 feet in height were desired, the top or roof and five rings were taken off and the roof replaced. The tanks were then jacked up, placed on a timber frame and moved onto a steel scow. Care had to be taken in moving on to the scow to avoid listing and possible overturning. This was avoided by placing long timbers from the dock across the entire width of the scow. The tanks were then lowered as much as possible on the scow and anchored by means of steel rods and steamboat ratchets. When weather conditions were favorable the scow, with its strange load, was towed to Milwaukee, a distance of 88 miles, where the tanks were unloaded and moved onto foundations previously prepared for them. The job was carried out successfully without the slightest mishap.

The Brier Hill Steel Co., Youngstown, O., in making extensive additions to its plant found it necessary to relocate a steel stand pipe, 16 x 100 feet, to a new location about 150 feet distant. A carrying frame consisting of 15-inch I-beams was placed directly under the anchor bolt lugs. The pipe was then raised with ten 15-ton jacks, placed on steel rollers and rails, and moved about 100 feet where it was necessary to raise it about 5 feet so as to bring it to the elevation of the new foundation, 50 feet away. The height and small diameter of the stand pipe made it a delicate job to handle. Guy ropes had to be attached to the standpipe in order to keep it as plumb as possible.

Improves Wood Miller

Several improvements have been made by the Oliver Machinery Co., Grand Rapids, Mich., to its wood-milling machines which are designed for general pattern shop work. Illustrated on this page is the smaller model, which has been improved by the addition of a table so constructed that it may be tilted in any plane and rotated about a vertical axis. The compound cross slides are placed above the double swivel and tilting mechanism so that these slides will operate irrespective of the position of the other members of the table. The old table had only a single slide. Another feature of the improved machine is a broader and stiffer column as well as a larger base, all of which help to reduce vibration. Both horizontal and vertical spindles run on ball bearings and may be operated at a maximum speed of 5000 revolution per minute. Core box cutters up to 3 inches in diameter are supplied as regular equipment, although larger core boxes may be cut. By using the vertical spindle, work up to 19 inches in diameter may be turned when the revolving table is used. Similarly, by using the horizontal spindle and the revolving table, work up to 48 inches in diameter may be turned. A special dividing head enables the operator to cut spur and bevel gears up to 24 inches in diameter. The model illustrated on this page may be equipped for belt or motor drive.



IMPROVED WOOD MILLER FOR THE PATTERN SHOP

Efficiency Test of a Large Turbine

Peculiarities Revealed by Efficiency Curves Indicate New Characteristics of Operation as Larger and Larger Turbo-Generators Are Placed in Service—Unusually High Hydraulic Efficiency Was Obtained

BY H. G. STOTT AND W. S. FINLAY JR.

THE determining factors in the selection of power-generating equipment, either for an original installation or replacement purposes, present about as many variables as there are installations. Engineering experience has practically standardized the electrical considerations. The steam engine, on the other hand, does not seem to have been capable of such standardization, as engineers do not agree upon the most desirable superheat, pressure, etc., which must be considered both from the standpoint of reliability and boiler and engine economy. This thought is more than ever pertinent at this time, as it appears that we are on the eve of the employment of higher pressures and perhaps even new systems of power generation.

Further, the capacity of the machine to be selected and the relation of point of best steam consumption to maximum continuous load and provision for heavy overloads for limited periods are all dependent on load factors, diversity factors, etc., which present a new problem for every installation.

No Hazards Involved

Without detailing at length the considerations which led to the selection of three 30,000-kilowatt units for the Seventy-fourth street station of the Interborough Rapid Transit Co., New York, a brief summation of the main questions involved will possibly be of interest and serve to classify the installation properly. The prospective daily plant load, as was subsequently demonstrated, could be best provided for by units of 30,000-kilowatt maximum continuous capacity. At that time there was assurance that machines of this capacity could be constructed, and furthermore, by the employment of the two-speed compound principle, no hazards were involved, nor in fact would there be any departure from well-tried principles of construction. Ample steam supply was available by reason of development in the matter of relative boiler capacity coincident with the increase in efficiency of prime movers since the original construction of the plant in 1902. Economic considerations warranted the withdrawal of the horizontal-vertical, double cross-compound, engine-generator sets installed at that time, and their replacement by more efficient and larger units.

Two Element Turbines Selected

In the development of turbine design, at the time the installation was being considered, possibly the simplest type of machine in many ways was the single-shaft, single-rotating-element turbine, which was a natural outgrowth of the generally accepted type developed in smaller capacities. Certain structural features, however, inherent with the larger capacity tended to favor the division of the unit into two elements.

In a steam turbine, maximum centrifugal stresses are encountered at the exhaust end, where the greatest steam volume requires the greatest blade area. In the high-pressure blading which uses steam of small specific volume, the best velocity ratio conducive to high economy cannot be met by the rotating speed as determined by the exhaust end. To avoid a compromise the conditions seem to be more readily satisfied by carrying out the expansion in two separate elements and avoiding congestion, due to the high specific volume of the steam at 1-inch absolute exhaust pressure, by the use of the lower speed, longer blades and the double-flow principle. Reliability also seemed better served in the double-element machine by the shorter shaft and reduction of danger from temperature strains. Furthermore, there was the possibility, in an emergency, of operating either element of the unit alone, and that at a fairly high efficiency, the low-pressure element being available for service simply by the use of a by-pass. The use of the high-pressure end alone in the case of a bad breakdown on the low-pressure end was to be obtained by removing the low-pressure rotor and closing the shaft openings with special covers.

An extremely important consideration, favoring the divided unit in this particular instance, was the matter of the weight of the parts to be handled by the crane, which, in the case of the single unit, involved provision for additional crane capacity beyond that then available at the plant. To take care of such additional requirements would have necessitated the installation, not only of a new crane, but of reinforcements of the steel work of a most elaborate nature and far in excess of that required for use in connection with the double unit. In the matter of efficiency, the double unit offered desirable possibilities in the relative flatness of its water-rate characteristic.

One of the complete units is shown in Fig. 1. The high-pressure element with its governing apparatus is in the foreground. This element is practically a typical single-cylinder reaction turbine, containing 38 rows of blades. The low-pressure element shown in the background of Fig. 1 is a turbine of the double-flow type. The casing is possibly unusual in its size and details of reinforcement. The rotor of the low-pressure turbine is shown in Fig. 2, and the interior of the lower half in Fig. 3. No blading is mounted directly in the casing but through the intermediary of rings secured to it, as shown in Fig. 3. The central portion of the low-pressure rotor consists of a drum to which are bolted two cast-steel shaft ends. These shaft ends have disks mounted upon them, carrying the last rows of blades.

Spring Jacks Carry Load

Inasmuch as the high-pressure rotor was inherently of small diameter, it was possible to design it to operate at the maximum speed possible for 25-cycle service, that is, 1500 revolutions per minute. The low-pressure turbine was designed for the next lower synchronous speed, namely 750 revolutions per minute, utilizing a four-pole generator.

The surface condensers which occupy most of the open space beneath the foundation framework each consist of two shells containing 25,000 square feet of condensing surface. The condenser shells are connected directly to the turbine outlets without an intermediate expansion joint. The weight of the condensers is carried by means of lugs, cast as a part of the shell, resting upon a number of spring jacks, which are adjusted to carry the load without appreciable strain upon the turbine exhaust nozzles. Practically no restraint has been put upon longitudinal expansion of the low-pressure turbine by the circu-

A paper presented at the December meeting of the American Society of Mechanical Engineers. Mr. Finlay is construction engineer and Mr. Stott, superintendent of motive power, of the Interborough Rapid Transit Co., New York.

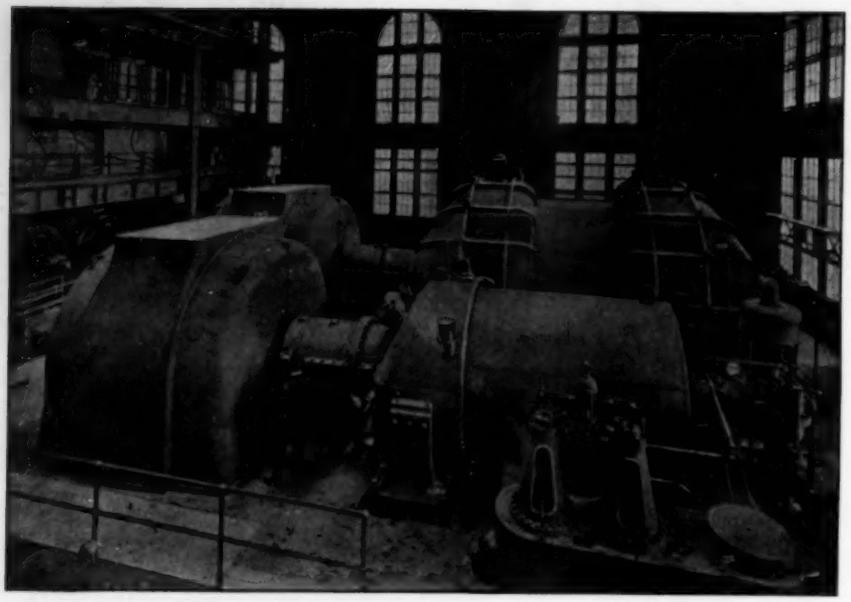


FIG. 1—30,000 KILOWATT, CROSS-COMPOUND STEAM TURBINE

lating water piping, which is fitted with rubber expansion joints. There is one expanison joint of copper in the steam-equalizing pipe between the shells.

The Auxiliaries

The condenser auxiliaries were selected and installed with the prime factor of reliability continually in mind. The turbine-driven tri-rotor circulating pumps of 37,500-gallon per minute capacity were installed in duplicate. The reliability consideration was augmented by one of efficiency in the matter of the relative requirements for winter and summer use; during the winter months with cold water, one pump is sufficient, but during the summer months high water temperatures necessitate two units in service.

The hot-well pumps were also installed in duplicate. A single rotary dry vacuum pump was provided for each unit, with sufficient capacity to handle the dry air from two units, cross-connections being provided for the purpose.

The turbines are equipped with water-sealed glands. The gland water system has a small centrifugal turbine-driven pump for each unit, the piping for all of which is cross-connected through a common header. The water used for the turbine-oil coolers returns the heat which is thus regained in the feed-water heaters.

Operation of Feed-Water Heaters

The exhaust from the auxiliaries has been carried into the feed-water heaters which operate at low pressure. The shortage or excess of heat in this heater system, as the case may be, is compensated for or utilized by means of heat-balance valves operating between the auxiliary exhaust lines and the receivers between the turbine elements. For test purposes one unit was selected as representative of the installation. Tests were made upon this unit by the use of standard methods, special provisions being taken to secure accuracy. Some of the precautions are outlined in the following paragraphs.

High steam pressures were observed by the use of gages, in duplicate where of importance, such gages being calibrated before and after each test. Temperatures were observed by carefully calibrated thermometers immersed in iron pipe wells filled with mercury or oil, depending upon conditions. Wells were of ample depth and correction was made for immersion. Low pressures were observed by the use of mercury manometers. Vacuum readings were made with mercury columns provided with a vernier reading to 0.01-inch. The mercury in these columns was regularly cleaned and its specific gravity determined before and after test series, and corrections made accordingly. Temperature corrections on mercury columns were provided for by the use of thermometers set in each column casing; additional corrections were made for specific gravity, meniscus and barometer reading. The barometer used on the test was calibrated by reference to the U. S. weather bureau.

The condensate was weighed in tanks mounted upon two carefully calibrated platform scales. Platform scales were also used to measure drips and leakage. The unit was isolated so far as water and steam outlets were concerned. The large atmospheric relief valve necessarily remaining connected to the exhaust system was water-sealed, the seal being kept under continual observation by means of a window in the valve cover and interior illumination by electric light. The unit output was obtained by means of three single-phase rotating standard watthour meters, one connected to each phase.

The Electrical Loads

Each test was of three hours' duration with about a half hour preliminary operation under test conditions. The load was controlled from the switchboard, the turbine operating upon the governor with hand throttle wide open. This subjected the turbine to the full swings of the railroad load, as observed by means of a graphic wattmeter which furnished an interesting index of such load variations. At light loads these variations were pronounced, approxi-

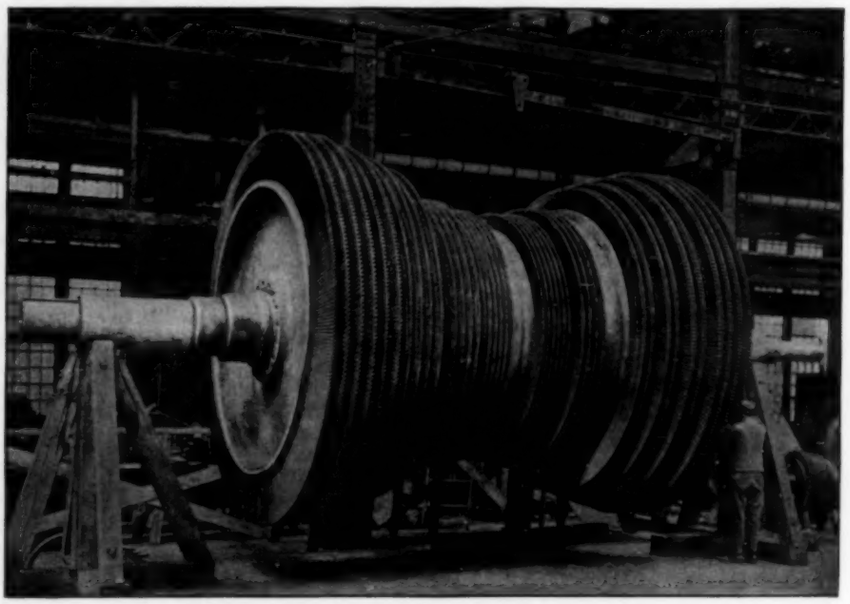


FIG. 2—ROTOR OF LOW-PRESSURE TURBINE

mating frequently 5000 kilowatt either side of the average. A variation of 10,000 kilowatt total in half a minute was not uncommon, especially on loads of 16,000, 18,000 and 20,000 kilowatts.

The test results have been shown graphically in Figs. 4, 5 and 6, upon bases of load and water rate, load and thermal efficiency, and load and rankine-cycle efficiency ratio. In conducting these tests, naturally every effort was made to maintain certain standard conditions under which guarantees had been given, and the test results as tabulated were corrected to such standards. These standards represent what is probably the average of operating service, and fortunately it was possible to carry out the tests under conditions but little removed therefrom, making the corrections, therefore, a matter of small consideration. Corrections for variation from standard conditions were based upon curves based upon calculations and the known results of previous practice.

With due allowance for scale of ordinates the performance curves may be considered unusually flat, naturally conducive to high plant efficiency. The dip in the curve between 22,000 and 26,000 kilowatts is a peculiarity which was received at first rather skeptically, but which was later remarkably checked by repetion of tests throughout the range, including a special series under steady load made three months subsequent to the original series. Various theories have been advanced in connection with this dip, and a series of special tests was made to investigate the relative action of the receiver between the two cylinders as a separator and the velocities of the steam passing through it, with the idea that this might have some direct bearing upon the dip. Unfortunately, winter load demands terminated further research work in this direction without any definite results having been obtained.

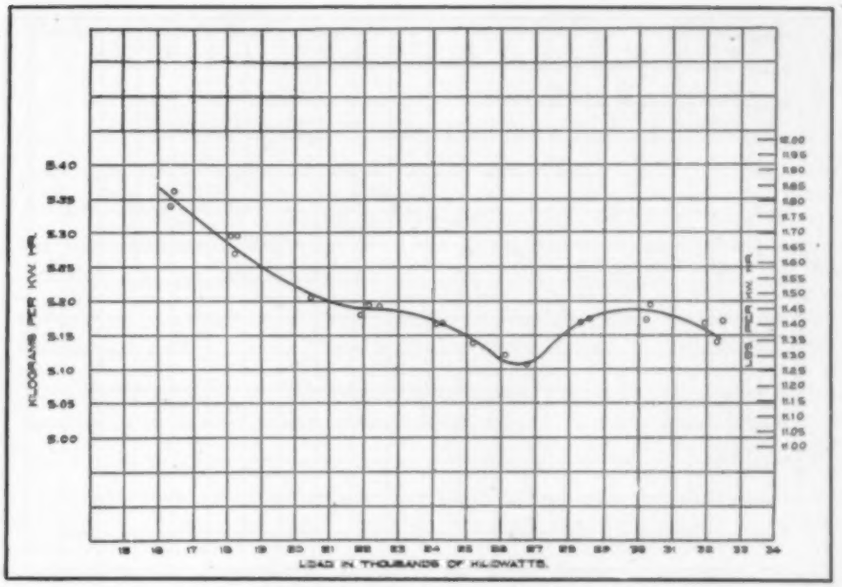


FIG. 4—WATER-RATE CURVE OF 30,000-KILOWATT TURBINE

The turning up of the curve between 30,000 and 32,000 kilowatts is another peculiarity, accounted for by the turbine designer as follows:

"Concerning the supposed inconsistency in these tests, that is, the turning up of the efficiency curve between 30,000 and 32,000 kilowatts, consideration and figuring indicate that this is actually not an inconsistency, but a new experience. This turbine was designed for higher hydraulic efficiency than probably any machine heretofore built, thus approaching the crest of the efficiency curve. The overload capacity of the machine is small, or, in other words, the amount the turbine is by-passed when the secondary valve opens is small, and the velocity ratio, therefore, is very little lower when full steam pressure is applied to the secondary inlet than when such pressure is applied to the primary inlet. Further, the hydraulic efficiency is nearly the same, so that the rankin cycle at 32,000 kilowatts should not be more than 1 per cent lower than at the point of best efficiency, namely, 26,000 kilowatts. The efficiency at the intermediate overload, say, 30,000 kilowatts, is somewhat worse than this, for while the blading and hydraulic efficiencies remain as high there is a loss due to a certain portion of the steam expanding through the secondary valve to a lower pressure without doing work."

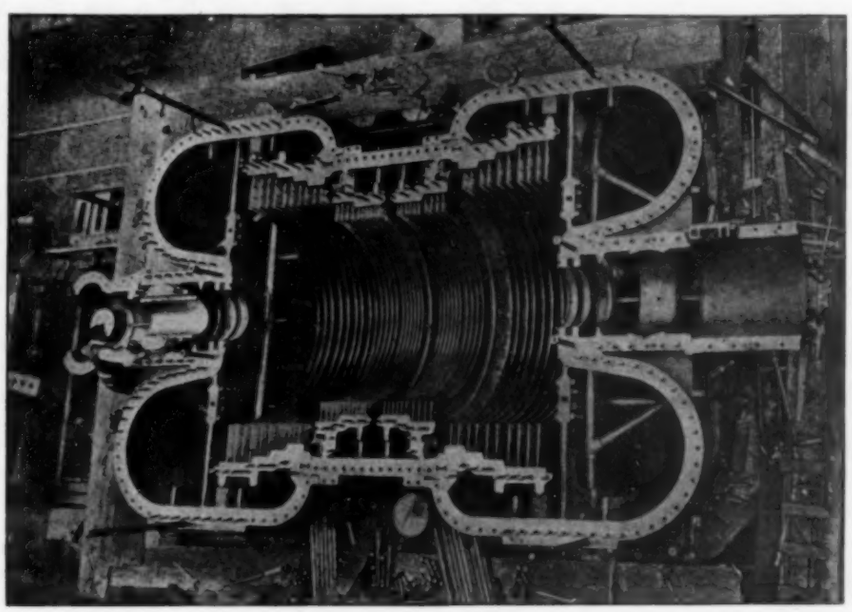


FIG. 3—INTERIOR LOW-PRESSURE TURBINE

A number of tests were made upon the condensers and auxiliaries, separate and individual guarantees having been made upon the condenser proper, circulating pumps, dry-vacuum pumps and hot-well pumps. Publication of the test data upon the pumps would simply show good, efficient performance without unusual features. The results of the tests upon the condenser, however, have been given simply as a matter of information and interest in connection with the installation as a whole. The guarantees were based upon operation under maximum load, namely, about 32,000 kilowatts, and the test was made with the turbine carrying as near that load as was possible. The duration of this test was three hours, and of the preliminary operation under test conditions, 30 minutes. The results are shown in the accompanying tables. No corrections were made in this test, as operating conditions approximated the guaranteed conditions very closely, with

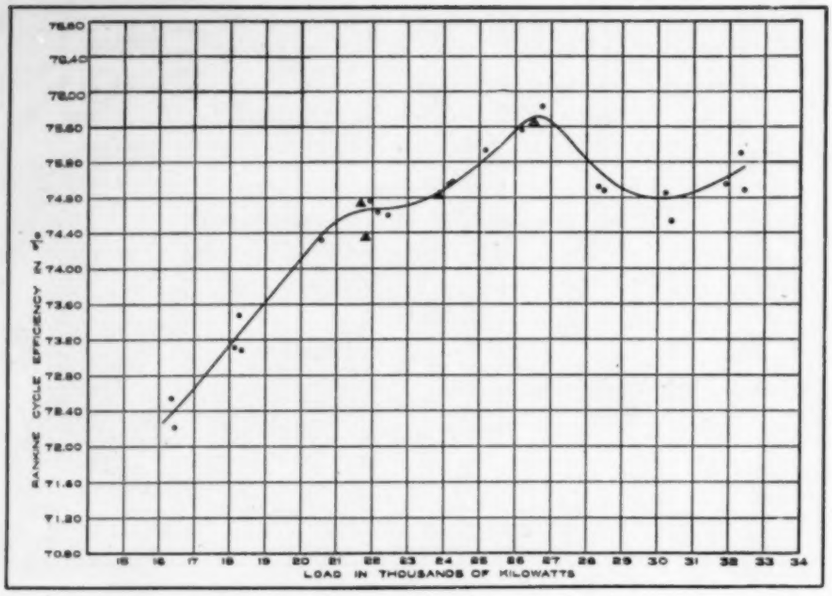


FIG. 6—RANKINE CYCLE EFFICIENCY CURVE OF 30,000-KILOWATT TURBINE

the exception that air leakage was high. The tests were made very shortly after the installation of the machine and little opportunity had been given under operating requirements properly to eliminate this leakage, which has since been done. A permanent gasometer has recently been installed in connection with each unit, in order to observe air leakage at regular intervals and aid in its elimination.

Two minerals not heretofore known to science have been discovered at Crestmore, Cal., according to a bulletin issued by Prof. Arthur Eakle, department of geology, University of California. Professor Eakle has christened the discoveries respectively "crestmoreit" and "riversideite." The first is described as a new hydrous basic orthosilicate, containing small amounts of other oxides in place of silica. The latter is a hydrous lime sulphate.

Less Swedish Ore Moved

Less iron ore was exported in 1917 from Sweden than in 1915 and 1916, according to report of Consul General William Coffin at Stockholm. He states that the *Stockholms Dagblad* of Dec. 16 gives the totals for 1914, 1915, 1916 and 1917, Jan. 1 to Dec. 15, as 663,000; 1,238,000; 1,459,000 and 1,175,000 tons, respectively. While destinations are not given it can safely be assumed that practically all of the shipments went to Germany.

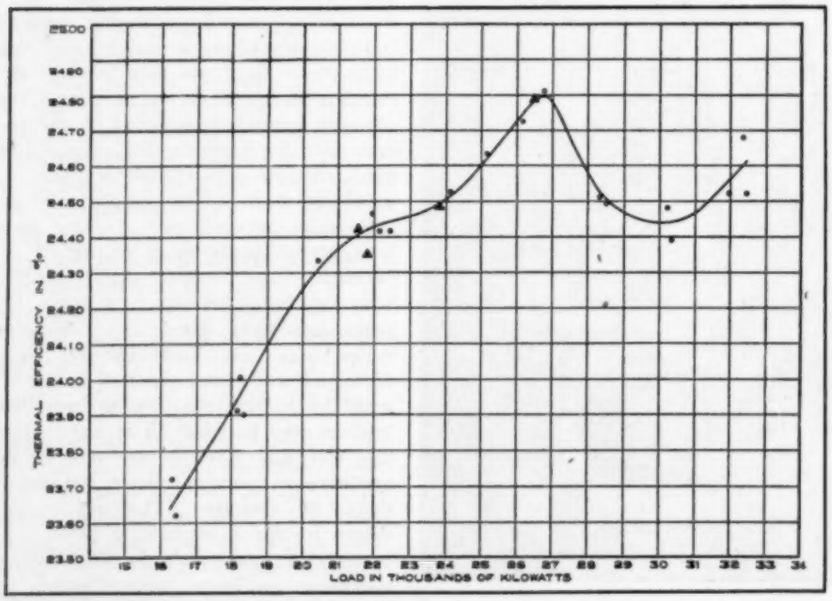


FIG. 5—THERMAL EFFICIENCY CURVE OF 30,000 KILOWATT TURBINE

Electric Furnace Presents Unusual Features

Patents on an exceedingly interesting arc type electric furnace, designed to provide a simple and effectual means of securing a uniform distribution of current, were recently issued to Carl Hans Vom Baur, Douglaston, N. Y. The entire furnace is a radical departure from any other unit at present on the market, the electrodes in particular bringing new ideas into play.

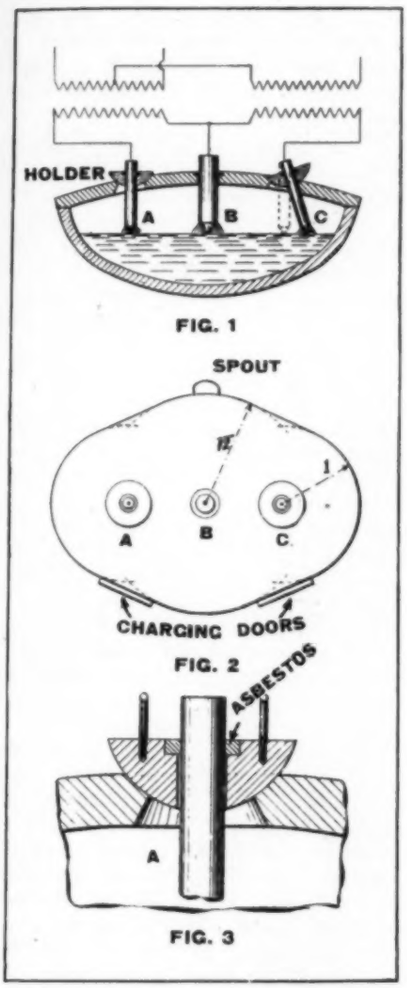
The electrodes pass through the roof of the furnace, which is made of any suitable refractory material. While they are normally in vertical position, arrangements may be made for adjusting the lateral electrodes, indicated at *a* and *c* in Fig. 1, so that their lower ends may be brought nearer to or farther away from the end walls. With this arrangement heat can be brought directly against any cold metal sections. For the purpose of such adjustment, the electrodes pass through holders of tubular structure, best illustrated in Fig. 3, and are held in place by means of washers. It is said that a direct fitting of the electrodes to the holders is impossible because the former are not made commercially in uniform diameters. The holders have spherical surfaces and are seated in sockets fitted into the roof of the furnace surrounding the openings made for the electrodes. They can be adjusted by means of handles which swing the electrodes into the desired position as indicated at *C*, Fig. 1. The side walls of the furnace are integral with the base. The central electrode is adjustable preferably only up and down, so that it is always in a vertical position.

The furnace is provided with a discharge spout, indicated in Fig. 2, and secondary doors designed for inspection, charging, patching, rabbling off slag, etc.

The two lateral electrodes receive like amounts of current, while the central electrode, preferably of larger diameter, receives current in the ratio of 1.41 to 1 to that of the lateral electrodes. The side wall is so shaped that it receives at every point approximately the same amount of current through the molten charge when the electrodes are in normal position. For this purpose the electrodes are arranged normally in the same plane and the distance from their lower ends, when in the vertical position, to the respective nearest points of the side wall are approximately in the same ratio as the amounts of current which the electrodes receive.

The position of the large electrode in the center is said to have pronounced advantages. Inasmuch as the cold metal is generally piled largely in the center of the furnace the manifest ad-

vantage of securing the most heat at that point is evident. Later when the charge becomes molten the position of this electrode will aid materially in keeping the bath in circulation. Again, by having the hottest portion of the charge furtherest from the side walls, the refractory material in the walls will not be subjected to such a severe strain.



SECTIONAL VIEWS OF NEWLY INVENTED ELECTRIC FURNACE

Valuable information pertaining to Lake Superior iron ore is contained in the booklet on ore analyses for 1918, issued by the Shenango Furnace Co., Pittsburgh. Beside giving the analyses of the ore produced and sold by the company, tables showing the methods of computing iron ore prices according to chemical variations and miscellaneous statistics of lake ore traffic are presented. Monthly bessemer and basic pig iron averages for a period of years also are shown.

The Pittsburgh district saved 400,000 tons of coal due to the five-day shutdown in January, according to figures supplied to the office of Fuel Administrator D. W. Kuhn.

Blast Furnace Preheater

A Preheater of Novel Design With Which a More Even Temperature and Reduced Fuel Consumption Are Claimed by the Inventor

A PROCESS patent applicable to blast furnaces has been granted E. E. Marshall, president of the American Manganese Mfg. Co., also independent operator of the Juniata Furnace & Foundry Co., Newport, Pa., and Lochiel Furnace, Harrisburg, Pa. The principle of this patented process is to take air coming from the blast engines and pass it through a preheating device, prior to its admission into the standard fire-brick stoves and from there into the blast furnace.

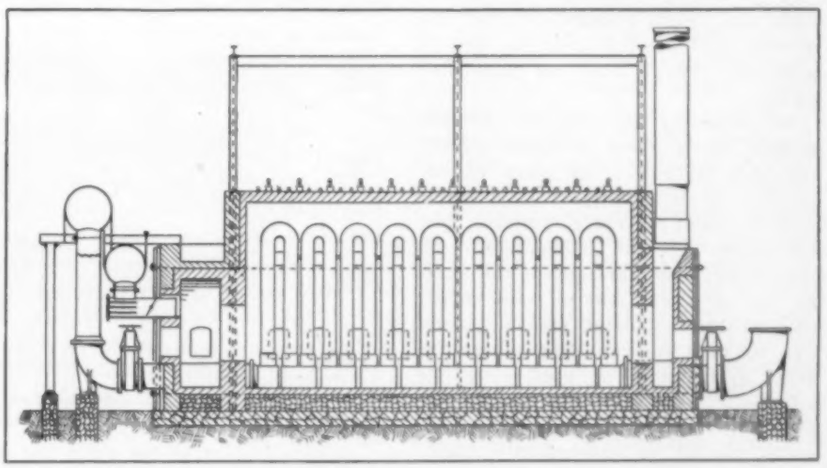
The advantage to be gained by this method of treating the blast for the furnace is to create a more even temperature in the blast going into the furnace, thereby decreasing fuel consumption. This increases the tonnage, as the furnace drives more uniformly, and it also reduces the number of hot blast stoves required for operation.

The construction of the preheater is the same as that of the old iron-pipe stoves that were used in blast furnace practice prior to the invention of the modern fire brick stove. It consists of a combustion chamber, a pipe chamber, and a draft stack chamber. The gas and blast are admitted at the same end of the preheater, or in other words in parallel. This is done to keep the first row of pipes cool by the incoming blast, which prevents the gas flame from warping and burning them out. The cold blast line from the engines is blanked by means of a valve. The cold blast to the preheater is admitted to the blast main, on the stove side of the blank or valve, and into the fire brick stoves through the cold blast valve on these stoves.

The blast is heated to any predetermined temperature in the preheater up to 900 degrees Fahr., which is the maximum for safety to the pipes, before admission to the fire brick stoves where it is finally raised to the required temperature for use in the furnace.

The action of the preheater on the stoves is as follows: The fire brick stoves coming off of gas are put on the furnace. The preheated blasts is admitted through the cold blast valve on the stoves. As the preheated blast has attained a rather high degree of heat in transit through the preheater, the heating surface of the stoves is not cooled off as fast as it would be if cold blast direct from the blast engines were being admitted to this same heat-surface. Therefore the reduction in stove temperature during the period that the stoves are on the furnace is not as great with the preheater attachment as without it. Consequently the blast has a more uniform degree of heat, with only a slight variation from the time the stoves are put on the furnace until they are taken off. Because of this small variation in the blast temperature, it is claimed the fuel is reduced per ton of metal produced and the tonnage increased, as the furnace drives more regularly, due to the fact that the temperature is more uniform. Another condition that it is said has been found to exist with the preheater connection on the stoves, is that the checkers in the stoves do not accumulate the dirt, as they do without this attachment. At Newport, after a six months' run on ferro-manganese, the stoves were opened and the checkers found to be almost as clean as when the furnace was started.

At Newport and Lochiel, with only two stoves at each plant, the Newport plant being equipped with modern Roberts stoves, and the Lochiel plant with two old Whittwell stoves, which prior to the preheater installation could never produce over 1050 degrees, on a ferro



PREHEATER SHOWING COMBUSTION, PIPE AND DRAFT STACK CHAMBERS

furnace, the temperatures have been averaging 1450 to 1400 degrees constantly. There have been occasions, it is said, where repairs on one of the stoves have necessitated the operation of one stove and preheater alone for 20 hours with a loss of only 350 degrees in the blast temperature.

The cost of the preheater installation is about one-third of that of a fire brick stove, and on a plant where there are three or four stoves such an installation would allow one or two stoves off continually for repairs, without reducing the output of the plant or cost of production. Furthermore, on a plant such as the Newport or Lochiel it would have been impossible to manufacture ferromanganese on a profitable basis without building more fire brick stoves.

Portable Welding Panel

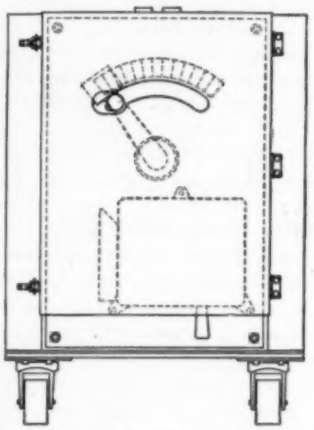
For an electric welding outfit to be of its maximum service, it must be so arranged that it can be taken to the work no matter where it may be located. One solution of the problem would, of course, be to locate a panel outlet of a suitable type wherever it is anticipated that electric welding might be desired. This would be a rather expensive proposition and many improvised means of solving the question have been proposed. A recently developed portable outlet panel manufactured by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., seems to meet the situation.

Two types of portable equipment are furnished, both being mounted on light trucks. They consist of a control panel mounting a handle trip railway type circuit breaker having overload release with magnetic blowout and a 13-point face plate connected to a register mounted in the rear of the panel. The face of the panel is protected by a metal cover through which the handles of the rheostat and circuit breaker project. The resistor is made up of grids and is protected by a cage of expanded metal.

In installing an electric welding system using these portable panels, the best method is to place an arc welding motor-generator set at some central point. Where suitable low resistance ground connection can readily be made throughout the shop, as for instance, where metal floors or cast-iron bedplates are in general use, or in a railway shop where the track system can be used, only one connector need be extended to the various receptacles. These receptacles should be conveniently placed throughout the shop.

Boiler Efficiency Test

In order to determine the efficiency of a 150-horsepower Brownell horizontal return tubular boiler an exhaustive 23¼-hour test was recently made with this unit at the plant of the Powdered Coal Engineering & Equipment Co., Chicago. Powered coal was the fuel used and considering the fact that the test was conducted in zero weather a good efficiency record was hung up. It is stated that the test was



WELDING PANEL DEVELOPED BY WESTINGHOUSE ELECTRIC & MFG. CO.

witnessed and verified by representatives of the Chicago city smoke inspection bureau, the city efficiency engineer, public utility corporations, and steam railroads.

The boiler furnace was served by two 12-inch powdered coal burners. It is stated that a high-ash coal together with screenings with a heating value of 10,158 British thermal units were employed. As burned under the boiler, the coal dust had a moisture content of 2.94 per cent. A screening test showed that 98.8 per cent passed through a 100-mesh and 90.5 per cent through a 200-mesh screen.

The steam pressure by gage was 135.1 pounds; temperature of feed water entering boiler, 145 degrees Fahr.; percentage of moisture in steam 0.95 per cent.

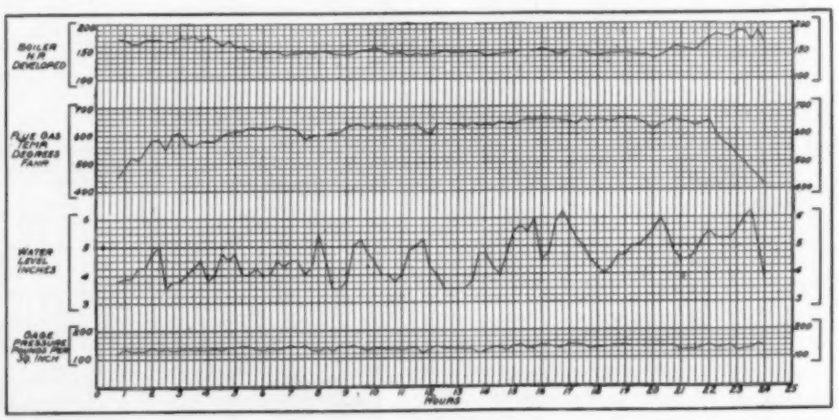
By weight, 17,625 pounds of coal were fired. Allowing for 2.94 per cent moisture, the total weight of dry coal consumed was 17,107 pounds. Ash and refuse were 22.09 per cent, or 3679 tons.

The total weight of water fed to the boilers, corrected for moisture in the steam, was 116,715 pounds. For each pound of coal fired, 6.69 pounds of water were fed. The equivalent evaporation from and at 212 degrees Fahr. was 7.59 pounds.

Final results showed the calorific value of one pound of dry coal to be 10,158 British thermal units; one pound of combustible, 13,039; and the efficiency of boiler and furnace 72.5 per cent. The accompanying illustration is a reproduction of the CO_2 chart, obtained over a period covering the duration of the test.

From the standpoint of thermal efficiency operating conditions were unfavorable. The powdered coal was lighted under a cold boiler three hours before the test was started, the average temperature of the air fed with the powdered coal being approximately 4 degrees Fahr. The ash and slag produced in the test, it is said, contained only a trace of combustible, less than 0.1 per cent, whereas bituminous coal of 18 per cent ash under ordinary conditions of grate firing will usually be found to produce an ash containing from 16 to 18 per cent combustible.

The horsepower developed during the test was recorded by a General Electric flow meter. This record of the water evaporated was checked by weighing the actual amount of water delivered to the boiler on automatic water scales. The results by the two methods agreed within a few per cent. The percentage of CO_2 in the flue gases was recorded by a Simmance-Abady precision combustion recorder. Checks were taken at intervals on samples analyzed in an Orsat apparatus.



RESULTS OF 24-HOUR TEST ON 150-HORSEPOWER, HORIZONTAL, RETURN-TUBULAR BOILER

War Converges on French Iron Ore

Possession of French-Lorraine and Adjoining Deposits Largely Will Determine Question of Victory and Economic Position of France or Germany in Future Years—German Industrial Powers More Boldly Demand Their Retention

BY FRANCIS MILTOUN

Paris Correspondent of THE IRON TRADE REVIEW

IRON as a prime necessity of warfare is lacking to Germany. France owns the most accessible available supplies—the Bassin de Briey and the Bassin de Longwy. Momentarily they are in the possession of the invader. This accounts for much of the progress of the German powers on all fronts. It accounts for many of the difficulties which for three years and a half France has struggled so hard to surmount.

In Germany six big industrial and economic organizations, chiefly those concerned with the metal trades—in a word all the big industries of Germany—have addressed a memorial to Hindenburg and Hertling, an echo of that previously addressed some months since to Bethman-Hollweg, urging the means of economic victory of after-the-war, and this is only to be brought about by the holding of the vast French iron deposits of Lorraine and the eastern frontier of France.

Bismarck's Foresight Faulty

The treaty of Frankfort did not provide for this nearly half a century ago, because at that time not even the astute Bismarck foresaw the vast possibilities of these eastern ore fields of France. Part was lopped off and given to Germany when the region of Metz was proclaimed the Reichsland, but his foresight did not go far enough. The bulk of the after-developed deposits still remained across the French border. France made much of them but she did not make the most of them, and she made the fatal mistake of swapping iron ore for German coal instead of developing her own coal fields to the limit. Today with the pounding of bombardment at the pits' mouths France is actually mining more coal than she ever did before. We are not getting much of it for heating purposes in Paris, and what we do get is costing approximately $50 a ton, but the French armament and ammunition industries are getting their shares and that is something.

Lord Northcliffe, in his Atlantic City speech, dwelt with insistence on the economic war which was to come after and urged upon the allies to make no mistake as to the measures which Germany was already taking toward securing an economic independence. Not the least of these efforts is that which tends to control the French-Lorraine iron ore deposits.

This second memorial which has just been launched by the German industrial powers is far more explicit than that which went before. It comes out squarely for the "annexation of the Bassin de Briey and the Bassin de Longwy, indispensable, first of all, because of the dependence which Germany will otherwise have on a foreign power for her provisioning in this mineral."

A Frenchman of authority, Francois Lebon, has just called the attention of the French government and the French metal industrial world to this latest German move which might be momentously disastrous for France. The presumption of the retaining of these ore fields contemplates the moving of the French frontier to the eastward of what it was before this world war began. This we hardly believe to be possible, but the trick has at last been played and it now only remains to be seen who holds the high cards.

The value of these deposits is immeasurable for Germany—or for France. Quoting again the words of the German manifesto—"absolutely necessary in case of a future war". If necessary for Germany it is equally necessary for France. The more this affirmation of the importance of these mineral deposits is considered the more understandable becomes the present silence of Germany on the Alsace-Lorraine question. A simple financial calculation confirms this: First, with respect to the deposits which Germany attributed to herself as a result of the operations of the war of 1871. In that portion which came to Germany as a result of the Treaty of Frankfort at that time there is estimated that today there remain 3,000,000,000 tons available. Operating profits at 2 francs a ton would give German operators a return of 6,000,000,000 francs, or $1,200,000,000.

The Coal Bassin de Sarrebruck is another rich territory for Germany. At the geological convention of Canada, held in 1913, it was estimated that Germany here possessed coal deposits of 16,000,000,000 tons as reserves of this one deposit alone, and this only in that portion already under exploitation by the Bavarian government and that of Prussia, including also a very few private operations. If France abjures any territorial conquest she may not acquire this property, but within all her rights she may very well claim its underground exploitation as an indemnity of war as it directly attacks the German government, not the individual. Should this come about these coal reserves, at the nominal figure of the equivalent of $4 a ton, will represent a capital of $64,000,000,000. This will go a long way to help repair the damages of war. Even the profits on operating should pay the bill, including the three French loans which have been launched since the war.

Secret of Verdun Offensive

It is within the bounds of possibility that the projected German offensive will seek to push back the lines still farther from these Saarbruck, Briey and Longwy coal and iron deposits, even to the gates of Verdun, indeed this was the whole theme of the struggle around Verdun since the beginning. It is for this reason alone that the Germans still persist in bombarding Nancy and holding tight on Saint Mihel, the two flanks which keep the allies at bay.

It is even reasonable to suppose that if Germany can hold these important, vital even, mineral holdings she would be willing to evacuate northern France and Belgium up to the forts of Liege. The objects of the war for Germany are summed up in two words—economic expansion, but at the expense of other nations. To date the war has proven this and the after-war procedure will not be far different. Iron is the incomparable necessity for a warlike nation. Take away its ability to get it readily in excess of genuine economic needs and the risk of a hardheaded disloyal competitor running amuck is reduced.

For this reason, it is necessary that the allies retake Briey and Longwy, or at least see that they ultimately come back to the control of France. They are distant from the fighting front but 12 to 20 miles along their whole length. A combined action on the west and south east would probably change the whole face of things if it succeeded. To carry this objective, to separate these resources from the

(*Concluded on page* 548)

Causes of Split-Heads in Rails

Examination of Rails Which Have Failed in Service Indicates That Split Heads Are Caused by Streaked and Seamy Metal—This Defect May Be Traced to Ingot Conditions

TRAVELING at a speed of 35 or 40 miles an hour, a passenger train on a single track branch of the Pennsylvania railroad near Newark, N. J., was derailed by a broken rail. The accident was investigated and a report prepared under the supervision of the chief of the division of safety of the interstate commerce commission. This report contains some interesting general engineering and metallurgical features. In part, it is as follows:

The rail which broke and caused the derailment was a 60-pound rail, rolled by the Cambria Steel Co. in March, 1887, and laid in the track in the following June. It bore the brand marks, "Cambria Steel 87 III."

The type of fracture was a split head. Failure took place in the receiving half of its length. About 3 feet of the rail, at its immediate receiving end, remained intact. Beyond this part there was a broken section, 8 feet 4 inches long, followed by an unbroken section, 18 feet 8 inches long, completing the length of the rail, 30 feet. The unbroken section was locally bent at the time of the derailment. Forty-eight fragments of the broken section were recovered.

The appearance of the recovered fragments is shown in Fig. 1, some of the fragments being assembled in their relative places, while others were laid in a row, their places in the intact rail not having been established.

The top of the rail showed an increase in width of 0.18 inch, as nearly as could be judged when the fragments were put together. This increased width corresponded substantially with the width of opening of the seam in the head, a relation generally found in splithead rails.

How the Head Was Formed

Lateral flow of the metal occurred in the shallow zone between the running surface of the head and the upper edge of the seam. The formation of a split head is attributed to the wedge action of the steel in this affected zone, reaching streaked metal, starting an incipient seam where the metal of the head in a crosswise direction is deficient in strength or in ductility, or both. The incipient seam gradually develops in length and in depth until there is complete separation of the head.

Longitudinal seams or lines of rupture with serrated surfaces were shown on the fragments of this rail. The head was split along the greater part of the 8-foot 4-inch broken section.

Serrated Rupture Formed

Fig. 2 is a view of the top of the head, the fragments comprising this part of the rail being placed approximately in their relative positions. Fig. 3 shows the under side of the head showing a serrated portion below the running surface of the outside half of the head. This part of the ruptured surface had been hammered comparatively smooth by the passage of trains over the rail, evidence of the progressive character of its failure.

A microscopic examination was made of a full cross section of the rail near the broken portion, followed by a microscopic examination of the steel in that vicinity. The microscopic appearance of the rail is shown in Fig. 4, representing a cross section after it had been polished and etched with tincture of iodine. There were zones of dark-colored dots near the periphery of the head, and adjacent to the under surface of the base. At the junction of the head and web, in the web, and near the upper surfaces of the flanges these markings appeared as lines. The changed appearance of the markings at different parts of the cross section is attributed to changes in shape which the metal undergoes in its reduction from the rectangular form of the bloom to that of the finished rail. In the earlier shapes from the ingot the markings are dots which are changed into dashes by the draft of the rolls in forming the rail. The unsymmetrical dark zone at the junction of the head and web is taken to indicate that the ingot from which this rail was rolled was laid on its side to cool.

Figs. 5 and 6 illustrate magnified images of a portion of the head and of one of the flanges, each in cross section.

A series of photomicrographs were made to show the micro-structure in different parts of the rail. The average structure at the middle of the head

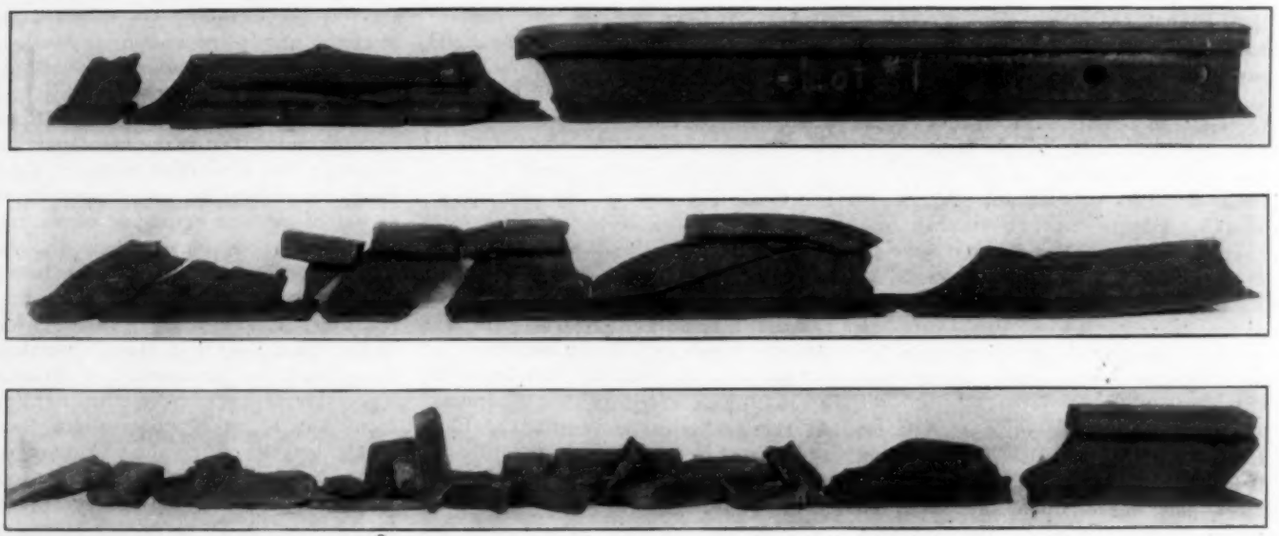


FIG. 1—VIEWS OF FRAGMENTS OF RAIL-PIECES IN THE FIRST AND SECOND LINES ASSEMBLED IN APPROXIMATE POSITIONS. PIECES IN THIRD LINE PLACED AT RANDOM

shows coarse-grained pearlite which appears with thick irregular ferrite network. Low-carbon metal was found in a zone about ⅛ inch below the running surface.

The effect of wheel pressure is to cause a distortion of the grain of the steel immediately below the running surface of the head of the rail. In a crosswise direction the metal yields and flows toward the side of the head, taking the path of least resistance. Longitudinally, the tendency of the surface metal to flow is effectively resisted. The grains are flattened but do not show longitudinal drift. Whereas, the lateral flow of the metal tends to develop split heads, in a longitudinal direction, the inability of the metal to flow, except at the extreme ends of the rail, results in the introduction of internal strains of compression, the presence of which promotes the formation of transverse fissures in the interior of the head where the opposite strains of tension prevail.

Cause of Split Head

The longitudinal streaks in the metal of this rail are believed to have had a direct influence on the formation of the split head. Examples of split heads have been witnessed in different stages of development, and incipient seams have been found to coincide with and follow the paths of interior streaks. The quest for the primary cause of the presence of streaked metal leads back to the ingot. Efforts to introduce streaks by heat or mechanical means have been unsuccessful. Conversely, their removal by heat or mechanical means has not been accomplished. Sudden quenching of hot steel will cause the formation of thermal cracks, but such cracks are of a different order to the streaks and seams under consideration. These are present in steel which has cooled slowly.

Mass segregation occurs in the cooling of ingots, shown in the chemical analysis of the metal. There are slag or other nonmetallic inclusions in different parts of the ingot and blowholes are also found. The primitive condition of the ingot exercises its influence over the structural state of the finished rail. The large reduction in sectional area given the metal of the ingot orients these structural conditions and leads to the formation of longitudinal streaks in the rail. Lengthwise the rail this structural arrangement seldom affects its serviceability. In a crosswise direction, however, the character of the streak becomes an important factor, especially when service stresses approach the limit of endurance of the steel.

The streaks brought to view upon etching with tincture of iodine differ in their characteristics, each variety assuming greater or less importance, depending upon the severity of the service stresses. There are streaks which represent metal enriched in carbon; others in which ferrite predominates. In these streaks the continuity of the metal is not lost. The welding of blowholes may be partial, the efficiency of which in a degree depends upon the composition of the steel. The presence of slag is a barrier against welding and at such inclusions the continuity of the steel is interrupted.

FIG. 2—VIEW OF THE TOP OF THE HEAD OF THE RAIL-FRAGMENTS ASSEMBLED IN APPROXIMATE PLACES

Wheel pressures which cause lateral flow of the metal in the head of the rail differentiate the properties of these streaks. Whenever evidence is presented of permanent flow having taken place, the rail problem has evidently passed beyond the stage in which the elastic limit of the steel is a controlling factor. The rail is practically certain to fail in course of time, under a repetition of these overloads. The life of the rail may be prolonged or its type of failure changed by the elimination of streaks. It is highly desirable that structural soundness be attained as nearly as the art of steel making permits. A margin in strength should be maintained between working loads and the ultimate resistance of the rail in which structural soundness is an essential factor.

Supplementary tests were made on two sections of the rail, for the purpose of illustrating the changes in the internal strains which may be accomplished by bending loads, independent of the cold rolling action of the wheels. One section was bent downward; that is, with the head on the concave side, straining the flanges in a tenside direction. The flanges were left in a state of initial compression. The result of giving the rail a slight permanent set in this direction was uncertain, on account of doubts attaching to the magnitude of the primitive strains. The second section was bent upward, that is, with the head on the convex side, straining the flanges in a comprehensive direction. This bending resulted in a reversal of the primitive strains, the flanges being changed to a final state of tension. It was thus shown that the normal strains of compression in the flanges may be reversed and tensile strains introduced by cold bending, although the permanent set given the rail is of slight amount.

Rail failures are usually traceable to definite causes upon which the rails themselves furnish reliable evidence. The fractured surfaces are the written pages upon which the data are recorded.

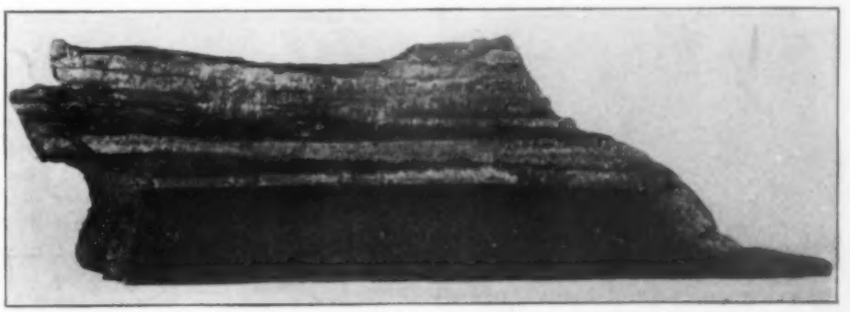


FIG. 3—VIEW OF THE UNDER SIDE OF THE HEAD OF RAIL-SERRATED SURFACE OF FRACTURE HAD BEEN HAMMERED COMPARATIVELY SMOOTH

The incipient point of rupture, whether located in the head, in the web, or in the base, the progressive development of fatigue fractures, referring to the type of transverse fissures; the direction in which the fracture traversed the cross section of the rail; distinctive marks differentiating primary and secondary lines of rupture; all of these features are commonly shown by the fractured surfaces.

In the examination of a fractured

rail, interest primarily centers upon the metal at the immediate point of origin. At this place the structural state or physical properties of the steel or the conditions of service reach a maximum and become responsible for its failure. The failure of the present rail was undoubtedly precipitated by the seamy state of the metal in the head. The steel was of medium hardness in respect to its chemical composition. Wheel loads had not distorted the general shape of the head except at the broken section.

Repeated impulses along different elements of the head, their paths varying according to the lines of contact made by wheels of different contours of threads, had effected a hardening of the surface metal covering a width of 2 inches.

Internal strains were introduced, amounting to many thousand pounds compression, measured in the direction of the length of the rail. Lateral flow had taken place in the metal next the top of the head, shown at the surface by a flattening of the grains, and necessarily exerting an effect on the interior metal. Under the influence of lateral flow, it is believed that an incipient crack was started in the interior of the head, this effect reaching some line of structural weakness, or place where the continuity was interrupted by a slag or other seam.

A measurable increase in the width of the head, in rails which have otherwise maintained their primitive shape, commonly signifies that a seam is in

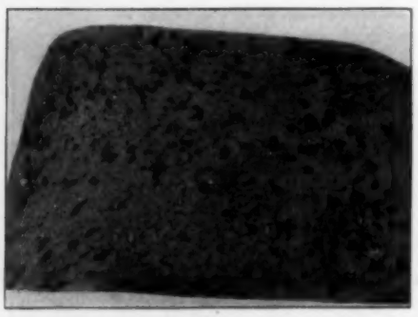


FIG. 5—CROSS-SECTION OF A PART OF THE HEAD OF THE RAIL-MAGNIFICATION, FOUR DIAMETERS

progress in the interior. Very soft rails may show increase in width without a split head necessarily being in process of development. The deformation may be confined to the formation of a fin along the side of the head. The detection of a split head in the very earliest stage of its development does not appear feasible. In its more advanced stage the general increase in width of the head, or droop at the under side, or a discolored line along the running surface, are the recognized indications of the presence of a split head. By reason of the difficulties attending the detection of a split head before it has reached an advanced stage, and the possibility of error in judgment in interpreting the significance of the first visible indications, every effort should

FIG. 4 — CROSS-SECTION OF RAIL-MARKINGS SHOWN BY POLISHING AND ETCHING WITH IODINE

be made to eliminate the presence of streaks from the steel.

Rolling Modifies Streaks

The sequence of the passes in the rail mill, in the reduction of the bloom, is shown to be favorable in respect to the modification of the form of the streaks which are located in the different parts of the cross section of the finished rail. The streaks have an acicular formation in the more critical parts of the head and the base, one which probably minimizes their influence in leading to split heads and some kinds of base fractures. The draft of the rolls converts these acicular lines into seams of considerable width in the metal of the web and at the junction of the web with the head and the base. Structurally, these seams are more detrimental than the acicular lines, but they are located, fortuitously though it may be, where their presence is seldom felt.

A careful examination of the metal at different stages from the ingot to the finished rail is essential for a thorough exposition of the subject of streaks. Blowholes and shrinkage cavities disappear from view in the early passes of the blooming mill. Slag or other nonmetallic inclusions, found in globular form in the ingot, are drawn into acicular lines in the finished rail, modified in shape at the web, as above stated. Regions differing in chemical composition from the surrounding metal appear as bands of varying width and thickness. These structural variations are frequently of such an order that the results of chemical analysis do not adequately indicate the state of the metal. Drillings for chemical analysis taken at a streak are so diluted by the surrounding metal that the characteristics of the streak are obscured. If the seaminess is due to an incompletely welded blowhole, structural rather than chemical manifestations should be looked for. Microscopic examination offers a promising method of test in this connection.

All rails are subjected to internal strains, which are not negligible factors, as the magnitude of their values indicates. If it were feasible to furnish rails initially free from internal strains they would not remain so. The cold rolling of the wheels in the track promptly introduces strains at the running surface of the head. No grade of steel has been examined which has resisted this action of the wheels.

Another feature may be mentioned in connection with the introduction of internal strains, and which results from the application of overstraining loads. It has reference to the impairment of the primitive values of the elastic limit, both in tension and in compression, and has an influence upon what might be termed the state of saturation of the steel for internal strains. An overstraining load in either tension or compression has been found to lower the elastic limit of the steel in the opposite direction. In acquiring further information upon the phases through which the metal passes in reaching rupture, this feature will require consideration.

There was a notable difference in the behavior of the strips which were de-

FIG. 6—CROSS-SECTION OF A PART OF THE FLANGE OF THE RAIL-MAGNIFICATION, SIX DIAMETERS

tached from the head of a 125-pound rail. The strip from the gage side of the top of the head assumed a concave shape, while that from the outside sprung into a convex shape, each with reference to the running surface. Both strips showed a mean state of compression as previously stated. The springing of a strip into a curved shape is evidence that the intensity of the internal strains is variable, changing at different depths from the surface. It further appears, in the case of these

two strips, that the changes in one were in reverse order to those of the other, this reversal occurring in passing from the gage side to the outside of the head, a distance less than three inches. These and other variations witnessed in rails, after a term in service, stand as records of what has occurred in the track, and furnish a partial answer to the querry sometimes made, why all rails do not fail when some do.

Portable Radial Grinder

Adapted for general light grinding and buffing, a self-contained flexible grinder of the portable type has been marketed by the Mummert-Dixon Co., Hanover, Pa. In this grinder the wheel is driven by a motor mounted at the rear end of the tubular arm. Power is transmitted from motor to grinder wheel through a shaft and a single set of spiral gears. The head, arm and motor are carried on a two-wheeled ball-bearing trolley, which rolls on a steel track and is kept in alignment by a rack and gear on the side of the carrying frame. By attaching the tubular arm at its center of gravity to the trolley, the head and the motor are kept in equilibrium. The grinder is full radial and the head may be twisted completely around.

Moisture in Coke

Extensive experiments have recently been completed by Arno C. Feildner and Walter A. Selvig, bureau of mines Washington, D. C., for the purpose of ascertaining the most rapid and simple method for determining the moisture in coke. The results of these experiments are presented in a bulletin issued by the bureau, from which the following is abstracted.

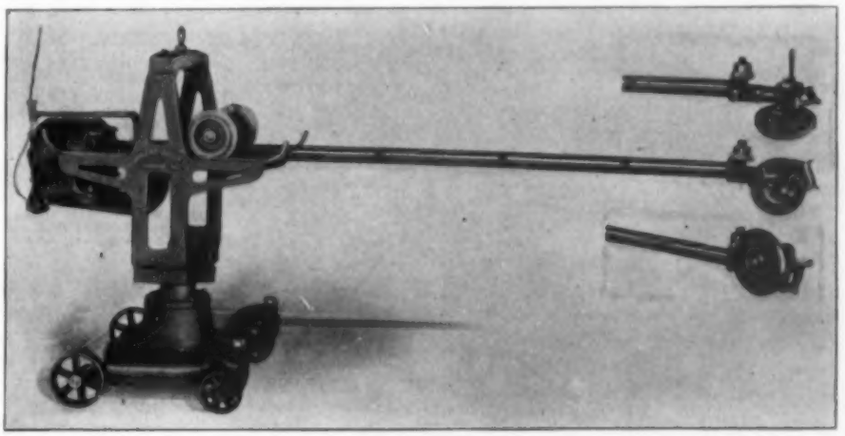
A series of tests were made to ascertain whether the circulation of dry air through the oven is necessary to remove the maximum amount of moisture. Twelve samples of different metallurgical cokes from various sources were prepared by crushing the air-dry coke to 60 mesh. Moisture determinations were made in duplicate by the standard method used by the bureau of mines for determining moisture in coal. Samples weighing one gram were placed in porcelain capsules and in sets of 12 heated for one hour to 105 degrees Cent. in a constant temperature oven. A current of air dried by concentrated sulphuric acid was passed through the oven and over the samples rapidly enough to change the total volume of air in the oven two to four times a minute. At the end of the heating period, the capsules were covered with closely fitting flat aluminum covers and cooled in separate desiccators over concentrated sulphuric acid.

Experiments on the direct determination of moisture in 1-inch lumps and also 4-mesh coke at various temperatures were made in the following manner:

A large sample of coke was taken from a pile that was wet from a recent rain and was crushed to 4-mesh size. This sample was then thoroughly mixed and divided into three representative portions, *A1*, *A2* and *A3*, which were treated as described below.

Sample *A1* was air-dried to constant weight at 30 to 35 degrees Cent., then rapidly crushed to 10 mesh by passing it through crushing rolls. The 10-mesh product was quickly reduced on a riffle sampler to 400 grams and then pulverized to 60 mesh in an air-tight porcelain Abbe ball mill containing flint pebbles. The 60-mesh sample was then reduced to 60 grams on a small riffle sampler and placed in a rubber stoppered bottle. The residual moisture in this air-dried sample was determined at 105 degrees Cent., as previously described.

Sample *A2* was dried to constant weight at a temperature of 105 degrees Cent. in a Freas electrically heated oven without dry air circulation. Sample *A3* was similarly dried to constant weight in an ordinary gas-heated oven at a temperature of 150 degrees Cent. The maximum variation in the different samples was 0.12 per cent.



PORTABLE RADIAL GRINDER DESIGNED FOR GENERAL LIGHT GRINDING AND BUFFING

Brazilian Manganese Land

A contract recently has been entered into between two Norwegian companies and the state of Maranhao, Brazil, for the leasing of mining properties. Large manganese deposits are reported in the region of the land leased. The property is in northern Brazil on a peninsula of the Atlantic coast. The manganese deposits are thought to exist occasionally over about 20,000 acres. The property which is about 190 miles from Para and 150 miles from Maranhao, is held under an old grant dating back to 1806, given by the governor and confirmed by the King of Portugal. Numerous natural water channels intersect the property and a 200-tons lighter can approach within three miles of any point in the district.

Counsel George H. Pickerell at Para, Brazil, reports that a manganese deposit estimated at 300,000 tons crosses the above tract. The ore is black, partly hard and compact, and partly crystallized and is mixed with iron to some extent. It analyzes about 48 per cent metallic manganese. Other outcrops exist throughout the property and some give as high as 62 per cent manganese. It is reported that supplies and labor may be had cheaply, and that timber and fuel exist in quantities nearby.

Truck Division Expands Into New Company

After an existence of nine years as a department of the Chicago Pneumatic Tool Co., Chicago, the motor truck interests of the company were taken over, Jan. 1, by a new organization known as the Little Giant Truck Co. The new company will continue to build motor trucks ranging in capacity from one to five tons and equipped with a carburetor which permits the use of kerosene and distillate. Officers of the Little Giant company, which are the same as those of the parent company, follow: President, W. O. Duntley; secretary, W. B. Seelig; treasurer, L. Beardsley, and sales manager, T. J. Hudson. Headquarters of the company will be maintained in the Little Giant building, 1615 Michigan avenue, as heretofore.

War Converges on French Soil

(*Concluded from page* 543)

enemy, will be to dictate terms of peace rather than be dictated to. It will be an allied peace, not a German peace. This is individual expression, not necessarily that of the military chiefs, but it seems plausible, and since there are apparently some hundreds of thousands of people who believe the same, and not a few notabilities of the French metal industries who know it, we may yet see it accomplished.

Asks Foundry Saving

The milling division of the United States food administration has requested foundries and other users of flour for industrial purposes to eliminate such consumption entirely or to curtail it to a minimum. The following letter has been sent to foundries: "In the milling regulations there has been an allowance made for the commercial uses of low-grade flours, recognizing the economic function which they perform, but we are taking this opportunity of writing you concerning this point, in hopes that if you are using in your foundry work, flour which could be consumed as food, that you take the necessary steps to confine your purchase of flour for foundry purposes to low grades.

Study Action of Caustic on Steel

INTEREST in the effect of caustic liquors on steel plates has become evident simultaneously in England, Holland, the United States and Germany. In a recent paper before the British Iron and Steel institute, Dr. Wolff, of Holland, referred to the failure of a marine boiler which had been dosed with soda for some time. He called attention to the tests made by Prof. Parr and detailed in a bulletin of the University of Illinois.

In these tests, samples of steel were immersed in caustic soda solutions kept at 212 degrees, 356 degrees, and 536 degrees Fahr., respectively. From time to time over a period of 30 days, samples were removed and tested on the fatigue testing machine in comparison with a sample of the same quality steel which had not been treated with the solution. The results, which were expressed in percentage of the untreated sample, showed a reduction of tenacity of about 20 per cent after treatment.

In a recent issue of *Engineering*, London, C. E. Stromeyer, chief engineer of the Manchester Steam Users' association, approves of the method of conducting these later tests except in the fact that the test samples were not under stress while being treated with the caustic soda. He reports further a series of tests which he is conducting, in which stress is kept up in the test pieces so far as possible.

Stressed Rings Tested

Several pairs of rings were cut from a solid plate. Some were tapered on their inner and some on their outer circumferences. They were then placed one above the other and driven together, so that the inner ring was under compression and the outer under tension. There were seven rings used in these tests. One ring was not stressed, but was boiled for some time. One pair of rings was annealed and the other two pairs were not annealed. One annealed pair of rings and one unannealed pair were then placed in a caustic evaporator and exposed for four months. At the end of this time all of the rings were sawed in pieces and of each ring one short piece was bent inward and the other outward. The results reported were consistent.

All of the untreated samples, and also all of those which were in compression, when exposed to the caustic, bent double without cracking. The two rings, both annealed and unannealed, which were under tension when treated with the caustic, cracked in a number of places when bent. These cracks appeared both on the surface, which had been in contact with the caustic and on the unexposed surface pressing hard against the compression ring. The influence had therefore penetrated through ¼ inch of metal.

Test Flattened Springs

It was decided to deal with the problem on more comprehensive lines. Accordingly, four sets of bars were obtained, namely, open-hearth steel both acid and basic, bessemer steel and wrought iron. They were cut into 10-inch lengths, curved in boiler rollers and placed back to back between two stout iron plates. End screws were provided which were screwed down, so the samples were nearly flattened. One each of the four sets of samples was then placed in vessels containing varying solutions of caustic soda and hermetically sealed. These vessels were placed in the steam space of a Babcock & Wilcox boiler and left for four months.

On removing and opening the vessels it was found that the treatment had entirely removed the spring of the samples, the least turn of the bolt nut allowing it to be slacked back entirely. The samples therefore had not been kept in a stressed condition, and on testing by bending, it was found that their ductility had not been impaired. This experience was disconcerting, and, Mr. Stromeyer states, may account for the results obtained by Professor Parr, who could detect no effect due to straining. The experience is not without practical interest, as it points to a possibility that caustic liquor may cause a slacking back of rivets and caulked edges, and lead to leakages.

The caustic liquor produced a marked effect on the samples. The samples as bent and exposed were too wide for the testing machine used, and had to be sawed in two. The band saw would not cut them, and milling cutters, which were then used, had to be run at the slowest speed, and even then teeth were broken. Yet the original bars could be cut quite easily at the highest speed.

It will be no easy matter to devise tests which will maintain the samples in a strained condition, for in the experiments noted the stress was produced by the elasticity of the material, and if that fails, the stress disappears. The case is different in a boiler, for there the stress is due to the boiler pressure, and though the caustic may relieve some stresses, as is shown by the flying off of rivet heads, the average stresses will be maintained, and some local stresses may even be increased.

A committee of the Chicago city council is drafting an ordinance to impose an annual tax of $500 on all wholesale junk and scrap dealers and of $250 on retail dealers. At present no license fee is paid by wholesalers while $50 annually is paid by the retail dealers.

E. N. Breitung & Co., Cleveland, have issued an attractive booklet containing a complete list of the various grades of iron ore mined and shipped by their subsidiary companies. An analysis of each grade also is given.

Mining Men Discuss War Problems

American Institute of Mining Engineers at New York Meeting Considers Manufacturing, Employment and Coal Conservation Questions With Particular Reference to Making Country's War Plans More Effective

WAR, labor and conservation problems divided the attention of the mining engineers at their annual meeting at New York last week. The meeting was the 116th held by the American Institute of Mining Engineers. The program included an unusually able series of papers discussing problems of interest not only to the mining fraternity but to the country at large. Several sessions were especially devoted to a consideration of employment problems, these meetings attracting a large number of delegates.

Interest in iron and steel manufacturing difficulties, as enhanced by the war, was clearly reflected in the close attention given to the presentation of the paper by Dr. Henry M. Howe on "The Erosion of Guns". Dr. Hudson Maxim presented this paper in a comprehensive resume. The war has forced American manufacturers to take careful introspection of their limitations and possibilities and this study has led particularly to a consideration of improving present methods of munitions manufacture. This fact was demonstrated by the wide discussion which followed Dr. Maxim's remarks.

Conservation as a factor in giving greater vitality to this country's war efforts was an undertone during most of the proceedings. This was true particularly at the special sessions given over to a study of coal problems, in which discussion centered largely around the need of greater economies in the production and consumption of both bituminous and anthracite coal.

Labor problems as emphasized by the war were considered at two sessions, the papers ranging from studies of accident and sickness prevention to better training for workmen and to making a place in industry for soldiers crippled in the war.

Other sessions were given over to a consideration of the metallography of steel, geology and ore deposits, mining and milling, petroleum and gas, and nonferrous metallurgy.

Sidney J. Jennings was elected president of the institute. He is a mining engineer of broad experience. His work in the gold fields of South Africa had attracted wide attention before his return to this country. He now is vice president of the United States Smelting, Refining & Mining Co.

The annual banquet was held on Wednesday, Feb. 20, at the Biltmore. The retiring president, Philip N. Moore, discussed the conduct of the war. He pointed out the restrictive factors which have hampered the efficiency of various departments at Washington. He praised highly the dollar-a-year volunteers who have sacrificed everything to put themselves at the call of the nation. Bainbridge Colby of the shipping board, outlined the necessity for greater speed in ship production. He predicted that the tonnage of ships produced this year in the United States will be the greatest ever turned out by any nation. W. O. Hotchkiss, of the war minerals board, Dr. W. G. Miller of the bureau of mines, Ottawa, Can., and Captain E. E. Delieux of the French army, also spoke.

The delegates were taken on the opening day to the new subway workings in New York and Brooklyn. On Thursday the ground aviation school at Princeton, N. J., was inspected. The student battalion gave an exhibition drill and various points of interest about the university itself were inspected. President Hibben of the university delivered an address.

Iron and Steel Manufacturing Problems

IRON and steel manufacturing problems were given close attention at two sessions, on Tuesday afternoon and Wednesday morning. The former was devoted to general iron and steel practice, the second to the metallography of steel.

In his synopsis of the paper by Dr. Howe on "The Erosion of Guns", Dr. Hudson Maxim gave some interesting information on the importance of improving methods of gun manufacture. Dr. Maxim told how at one of the first sessions of the naval consulting board, the group of citizen advisers appointed by Secretary Daniels, of the navy department, Admiral Strauss, of the ordnance bureau of the navy, had stated that the solution of the problem of erosion was the most important question facing the navy. At that time Dr. Maxim appealed to steel manufacturers and to Dr. Howe to begin an intensive study of the subject, since he realized the difficulties to be confronted.

The united attention given this problem has already resulted in making possible the results attained at a recent test when 250 shots were fired from a 14-inch gun, or considerably more than ever achieved before. It is now possible, Dr. Maxim pointed out, for the big navy guns to fire as much ammunition as a battleship can carry. "Before Dr. Howe began his investigation," Dr. Maxim stated, "it was thought that the Germans knew more about steel than we did. We know better now. They not only did not know more, but were ignorant of much that we knew."

Rear Admiral Earle, present chief of the bureau of ordnance of the navy, discussed Dr. Howe's paper. He stated that generally erosion with the consequent enlargement of the bore, caused irregular wearing away and scoring. In the discussions, one suggestion advanced for solving the problem was to conduct practical tests with screwed plugs of different metals and alloys, and thus determine the material best adapted for use.

"Transverse Fissures in Steel Rails" were discussed by J. E. Howard, engineer-physicist, interstate commerce commission, Washington. He gave an exhaustive study of the results obtained in an investigation of

a rail failure on Aug. 25, 1911. Mr. Howard presented an extract from a report submitted to the National Association of Railway Commissioners, which summarized 25 causes ascribed as responsible for the formation of transverse fissures. Mr. Howard pointed out that "neither chemical analysis nor microscopic examinations have shown a definite cause for the development of transverse fissures". They have been found in rails of many types, manufactured by different methods and subjected to various classes of service. They have occurred in rails manufactured at widely different periods of time. He said:

The latter fact should remove doubts concerning any peculiar conditions having found their way into modern mill practice influencing this type of failure. On the other hand, traffic has increased, wheel loads have increased and speeds have increased; and transverse fissures are in general found where these conditions are well advanced. The girder strength of the rails has been increased, while the impinging pressures of the wheels still remain without amelioration. It is a disquieting matter that rails of the heavier sections recently laid have displayed transverse fissures. Mere increase in weight of section has not brought with it immunity from failure in this matter. It gives emphasis to the need of acquiring further data upon the features which have been discussed in this report.

The conclusion seems well founded, that transverse fissures are fatigue fractures, and that they develop in rails which are structurally free from any known defect. It is a modified type of fatigue fracture in which there is a compressive component in the rail next the running surface of the head. The presence of this compressive component accounts for the interior origin of the transverse fissure. It constitutes the difference which the introduction of the term "transverse fissure" was intended to emphasize over the common type of fatigue fracture in which this component is absent and which in consequence thereof has an exteror origin.

The discussion disclosed that the Bethlehem Steel Corp. will soon complete the development and construction of a special type of machine designed to test full-sized rails. Representatives of rail manufacturers pointed out the need of rail consumers discontinuing the practice of using rails of high hardness. This class of rails was developed to meet severe service conditions on curves. For this purpose, these rails have given satisfaction, but their performance has not shown their adaptability for other classes of service. Suggested remedies for transverse fissures advanced in the discussion were to support the rail more firmly, to decrease the loads and to increase the rail section.

At the session on the Metallography of Steel, S. W. Miller, Rochester Welding Works, Rochester, N. Y., discussed "Some Structures in Steel Fusion Welds". Mr. Miller presented microphotographs of some of the unusual structures he had encountered while examining welds made in steel by the oxyacetylene and the electric arc processes. He stated that these particular structures deserve special attention, first because of their probable practical importance in connection with the strength of welds, and second, because of their probable theoretical importance in connection with the deformation of iron and steel.

"Grain-Size Inheritance in Iron and Carbon Steel" was presented by Zay Jeffries, director of research, Aluminum Castings Co., Cleveland. "The Time Effect in Tempering Steel", by A. E. Bellis, metallurgist, Springfield armory, was published in THE IRON TRADE REVIEW, Feb. 7, and "The Effect of the Presence of a Small Amount of Copper in Medium-Carbon Steel", by Carle R. Hayward, assistant professor, mining, engineering and metallurgy, Massachusetts Institute of Technology, and A. B. Johnston, graduate student of this institute in THE IRON TRADE REVIEW, Jan. 31. A. L. Feild, assistant metallurgist, and P. H. Royster, assistant physicist, bureau of mines, presented papers on "Temperature-Viscosity Relations in the Ternary System," CaO-Al_2O_3-SiO_2" and "Slag Viscosity Tables for Blast Furnace Work."

Conserving the Country's Coal Supply

THE opening session on Monday, Feb. 18, was devoted to coal problems. Particular interest was aroused in the coal meeting by the paper on "Review of the Coal Situation of the World", by G. S. Rice. An abstract of this paper was presented in THE IRON TRADE REVIEW, Jan. 31. Mr. Rice illustrated his paper with maps showing the comparative resources of the present coal producing countries of the world. He outlined the problem of the fuel administration, which he stated "is not only a problem of production but also one of transportation." He emphasized that "the mechanical capacity of the mines in this country is amply able to take care of all its needs, but to obtain this capacity, the mines must have sufficient railroad cars regularly to ship this output and the loss of a day's output is one that cannot be made up." He concluded that there are enough men to produce coal if they could and would work every day. "Could" means railroad cars and mine supplies; "would" means willingness to stay on the job every day. He pointed out that:

Without sufficient coal, the railroads cannot transport the fuel and munitions of war; the munitions cannot be manufactured, and the shipping cannot obtain its fuel for transport of sailors and supplies. It calls for some sacrifice on the part of everyone in the home to conserve his own fuel supply and avoid unnecessary heating; on the part of the operators not to spare supplies, and the investment of funds to increase facilities, although he may have a small margin of profit. It calls for the miners to forego pleasures which will keep them out of the mine during working hours—in other words, not to loaf but to stay on the job, for which they will receive full benefit by increased earnings at the highest rate that labor has ever known. This country has drafted its young men for the greatest sacrifice that a man can make. Is there any logical reason why all able-bodied males should not be compelled to do at least eight hours work every working day until this war ceases, for which they will be paid far beyond what the man who makes the greatest sacrifice is paid? The enemy recognizes no restrictions of labor or time, so that the least that those of us who are at home can do is to stay on the job and put our hearts into it. The consumer may have to take a quality of coal that seems to him inferior, and it may cause him added expense to use it, but it must be remembered that any checking of the day's output for any reason is a loss which cannot be replaced.

Mr. Rice in his extemporaneous remarks pointed out that the use of liquid oxygen in the manufacture of explosives will be rapidly expanded. It is being used in Germany. The war industries board at Washington has been giving considerable thought to this question and at the present time is relying upon the active cooperation of the explosive manufacturers to bring this branch of their industry to the scale of production required.

A method of briquetting anthracite coal was discussed by W. P. Frey, fuel engineer, Lehigh Coal & Navigation Co., Lansford, Pa. This method has been employed by the Lehigh company and is designed to handle silt which had previously been regarded as almost valueless.

The extensive coal and iron deposits of the Pen-hsi-hu district of Manchuria were described at considerable

length in a paper by C. F. Wang, mining engineer. Mr. Wang outlined the nature of the deposits, the mining methods employed, and the operations at the concentrating, briquetting and smelting plants. The paper was presented in the Feb. 14 issue of THE IRON TRADE REVIEW, as a preprint.

Additional papers presented at the coal session included "The Drifton Breaker", by E. P. Humphrey, assistant superintendent, the J. S. Wentz Co., Upper Lehigh, Pa.; "The Economy of Electricity Over Steam for Power Purposes in and about Mines", by R. E. Hobart, mechanical superintendent, Lehigh Coal & Navigation Co., Lansford, Pa.; "Heating of Coal in Piles", by C. M. Young, assistant professor of mining research, University of Illinois, Urbana, Ill.

Employment Problems and Miscellaneous Papers

EMPLOYMENT problems were under discussion at two separate sessions on Wednesday, this subject being the only one which was considered at more than one meeting. The keen interest held at this time in labor and employment problems was clearly reflected in the time allotted for their consideration as well as by the number of delegates in attendance at both sessions.

Thomas T. Read, of the technical department of the New Jersey Zinc Co., New York, discussed "The Employment Manager and the Reduction of Labor Turnover". He emphasized the fact that the labor turnover in industry is so large as to justify the adoption of almost any means to bring about its reduction. His paper was presented in the Feb. 7 issue of THE IRON TRADE REVIEW. His conclusions are recapitulated as follows:

1. The cost of labor turnover in industry is large enough to justify extensive measures to reduce it.
2. Centralized hiring is the most effective means to reduce labor turnover.
3. Hiring by the foreman is a relic of outgrown industrial conditions.
4. Centralized hiring does not impair the authority of the foreman; he hires his men from the employment office and discharges them back to it instead of to the street.
5. Relieving the foreman of the labor of looking for men gives him more time for the performance of his proper duties and improves his efficiency.
6. The employment manager, being a specialist, is able to devote special skill and knowledge to the art of selling employment in his organization to the workman.
7. The employment manager is able to give the foreign workman the special attention he requires.
8. The employment manager also tends to restore the former conditions of direct relations between employer and employe and hence brings about a better *esprit de corps* in the organization.
9. The methods used by employment managers are much along the same lines in every industry, as human nature is much the same everywhere.
10. The results that have been attained through centralized employment speak for themselves.
11. The employment manager must be given sufficient rank, otherwise he cannot work effectively. A high type of man is required and the saving he is able to make justifies the cost of securing such a man.

"Industrial Accidents as a Labor Problem" was the title of a paper presented by H. M. Wilson, director of the department of inspection and safety of the Associated Cos. In this paper, which was published in THE IRON TRADE REVIEW of Feb. 14, Mr. Wilson points out that "there is a close relation between contentment in employment and good health, on one hand, and accident prevention on the other. A contented mind gives the worker an opportunity to think about and to know his work. It is the distracted man, the so-called 'star gazer', whose mind is elsewhere than on his work, who is the most unsafe worker. A strong physical body and an alert, healthy mind are among the best safeguards against accidents."

Dr. Thomas Darlington, chairman of the welfare committee of the American Iron and Steel institute, discussed "Illness in Industry—Its Cost and Prevention". This paper also was presented in the Feb. 7 issue of THE IRON TRADE REVIEW. "Social and Religious Organizations as Factors in the Labor Problem" was presented by E. E. Bach, sociological director of the Ellsworth Collieries Co., Ellsworth, Pa. This paper was published in THE IRON TRADE REVIEW Feb. 7. Mr. Bach emphasized that "this is a comparatively new field of research. The recognition of the human factor in industry, in whatever form, is bound to become more important as labor conditions become more acute. This is especially true where the foreign factor predominates."

"Training of Workmen for Positions of Higher Responsibility" was the subject of a paper by F. C. Stanford, chief electrician, Cleveland-Cliffs Iron Co., Ishpeming, Mich. This paper also was published in the Feb. 7 issue of THE IRON TRADE REVIEW. He concludes that "the workman should be afforded an opportunity to make up his deficiencies of undirected or misdirected youth through having access to some form of education which will fortify him in his chosen work. Industry has no greater asset than an intelligent workman."

Prince Hrebilianovich addressed the delegates on the necessity of "Getting the Foreign Workman's Viewpoint". He pointed out that this country's labor supply has come from two distinct groups of Europeans. The English, Scottish, Irish and Scandinavian immigrants were workers who came to this country to find new homes. On the other hand, the Lithuanian, Polish, Finnish, Russian, Slav, Austrian, Hungarian and Balkan immigrants were largely farmers who had been led by glowing descriptions of this country's wealth, to seek in America speedy financial independence, with the intention of returning to their farms in Europe rather than of settling in the United States.

As a result, he stated, the latter group of immigrants suffer disappointment and disillusion from the moment they land at Ellis island. He drew a further distinction between the two classes. The former group use their money in maintaining a good standard of living conditions while the latter send the money they earn back to Europe and retain barely enough to live on. The former class, by its earlier training, is individualistic. The latter is led by his cooperative training abroad to follow similar lines after reaching America.

Louis E. Rebner, dean of the extension division of the University of Wisconsin, and now serving in the department of labor at Washington, sketched the work of the employment service which that department has inaugurated. He stated that there were three great causes of labor unrest. The first is improper housing conditions, and this he stated will be met. The second is the standardization of wages. Lack of such standardization is responsible, he pointed out, for the present enormous turnover of labor. The third cause was the lack of proper training.

The employment service, as Mr. Rebner pointed out, is really an adjustment service. The aim is to secure through voluntary registration an accurate knowledge of the qualifications of each workman and to place him in the place for which he is adapted. The department of labor, he stated, does not intend to take men from essential industries but from nonessential industries. He urged manufacturers of nonessential commodities to recognize the need for sacrifices in order to expedite war work.

At the session of nonferrous metallurgy, consideration was given to six

papers. These included "Notes on the Disadvantages of Chrome Brick in Copper Reverberatory Furnaces", by Francis R. Pyne, assistant superintendent, United States Metals Refining Co., Chrome, N. J.; "Fine-Grinding and Porous-Briquetting of the Zinc Charge", by Woolsey McA. Johnson, Hartford, Conn.; "High-Temperature Resistance Furnaces with Ductile Molybdenum or Tungsten Resistors", by W. E. Ruder, Schenectady, N. Y.; "Zinc Refining", by Leland E. Wemple, metallurgist, American Zinc, Lead & Smelting Co., St. Louis; "Bone-Ash Cupels", by Frederic P. Dewey, assayer, bureau of the mint, Washington; and "An Automatic Filter at Depue", by G. S. Brooks, assistant superintendent, Mineral Point Zinc Co., and L. G. Duncan, Mineral Point Zinc Co., Depue, Ill.

At the session on mining and milling, the following papers were presented: "Some Practical Hints in Bucket-Elevator Operation", by A. M. Nicholas, Brisbane, Queensland, Australia; "Recent Tests of Ball-Mill Crushing", by C. T. Van Winkle, Salt Lake City, Utah; "Notes on Theory and Practice of Ball-Milling Particularly Peripheral Discharge Mills", by Pierre R. Hines, Milwaukee; "A New Method of Separating Materials of Different Specific Gravities", by Thomas M. Chance, Washington; "The United Eastern Mining and Milling Plant", by Otto Wartenweiler, Los Angeles; "Otis Passenger Elevator at Inspiration Shaft", by C. E. Arnold, Miami, Ariz.; "Branch Raise System at the Ruth Mine, Nevada Consolidated Copper Co.", by Walter S. Larsh, underground mine superintendent, Nevada Consolidated Copper Co., Ruth, Nev.; "Incline Top-Slicing Method", by W. G. Scott, superintendent Coronado division, Arizona Copper Co., Ltd., Metcalf, Ariz.; "Canvas Tubing for Mine Ventilation", by L. D. Frink, superintendent, North Butte Mining Co., Butte, Mont.; and "Measures for Controlling Fires at the Copper Queen Mine", by Gerald Sherman, superintendent, mine department, Copper Queen branch, Phelps Dodge Corp., Bisbee, Ariz.

Geology and ore deposits were taken up at the session on Wednesday afternoon. The papers presented included: "The Chilean Nitrate Industry", by Allen H. Rogers, Boston, and Hugh R. Van Wagenen, Pioche, Nev.; "Genesis of the Sudbury Nickel-Copper Ores as Indicated by Recent Explorations", by Hugh M. Roberts and Robert Davis Longyear, E. J. Longyear Co., Minneapolis; "The Relation of Sphalerite to Other Sulphides in Ores", by L. P. Teas, Ithaca, N. Y.

Every Ton of Iron Needed

Great Britain Stretches Its Output to Meet War Demands—High Grade Bars and Special Coated Sheets Advanced

Bureau of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Feb. 8, 1918.

THE pig iron industry continues as busy as possible, with every ton of iron going immediately into consumption. Smelters are very careful how they book orders, generally undertaking only small parcels. Production is restricted by scarcity of ore, fuel, lime and practically every material employed in connection with the blast furnace. The spell of wet and snowy weather had a very material effect on the output of ores and various furnace materials. A week of mild weather has enabled the canals and railroads to clear themselves of a good deal of traffic and the strain on the coal industry is a little relieved. It is reported that the arrangement recently adopted for pooling the tap cinder through a Birmingham firm of merchants is working satisfactorily, although certain difficulties have been met with. Scarcity of pig iron is a continuous difficulty; blast furnaces are in course of erection especially in Wales. Labor, however, is scarce, and these furnaces will be in operation some months later than was originally intended. There is a growing scarcity of steel-making irons and the supply is a matter of very considerable concern. At the Birmingham markets, Northamptonshire houses reported fairly brisk sales and as a tight hand is now kept on all exports home demands are getting a little better attention. Derbyshire houses are still booking very cautiously and applying the rationing principle by doling out supplies in small quantities. In Cleveland, though, there is rather more disposition to do business, shipments are greatly restricted. In the hematite branch, two furnaces have been added to those producing basic iron. Coke is scarce and is very carefully doled out.

High Grade Bars Advanced

A rather unexpected development this week was the addition to the price of marked bars. These high-class irons, very largely in demand for cable material, have been advanced 10s ($2.40) per ton, making the maximum basis £16 ($76.80) per ton. For the present unmarked bars are left untouched, the recognized price being £13 15s ($66) per ton. Everyone expects there will be a revision of prices at an early date. The chief interest of this advance lies in the fact that the ministry of munitions has not attempted to apply the subsidy system in this case. It is quite useless as an expedient for keeping down wages, and the advance will probably help to allay the bitter unrest over wages in the finished trade, because it will enable the sliding scale to give automatically the rise in wages to which the men consider themselves entitled.

The various iron works have issued notices this week pointing out that the wages board is pressing forward as quickly as possible with the scheme for paying the 12½ per cent advance and this announcement has undoubtedly prevented a general outbreak of the men who were threatening to strike for higher wages. The task of applying to the peculiar conditions of the iron trade an award framed rather for engineering conditions, has been difficult.

The Staffordshire Tinned Sheet association have put up the prices of tinned sheets £3 ($14.40) per ton, while lead coated sheets have been advanced £1 ($4.80) per ton. The principal reason is the great rise in the price of tin now well over £300 per ton. Large quantities of these sheets are used in aeroplane and automobile construction.

The supplies of steel continue insufficient, and, owing to a dispute in South Wales, the customary consignments of billets and bars have been considerably interrupted. On this account makers of plates and tin sheets have had to suspend delivery. The black country works are still full of orders, but the volume is not quite so heavy as it was, the general reason assigned being that recent developments in Russia have practically shut down that market as a destination for British war material. The most pressing demand at the moment is for scrap of which only small quantities can be got. Any good foundry scrap will realize the price of the finest qualities of machinery scrap. The government has this week applied to Birmingham merchants to do their utmost, by special efforts to supplement, the ordinary supplies.

Stockholders of the Baldwin Locomotive Works will hold their annual meeting in Philadelphia, March 7.

New Scrap Schedule Put in Effect

Recommendations of General Iron and Steel Committee Harmonizes Discrepancies in Original Announcement and More Clearly Classifies Grades—Some New Gradations of Prices Fixed—Commission Allowances Ignored

MODIFICATIONS of official scrap prices to equalize disparities between grades which had developed from the original schedules, and more complete definition as to the character of different grades are contained in the complete new announcement of iron and steel scrap prices and classifications, made by Chairman E. H. Gary, of the steel and steel products committee of the American Iron and Steel institute.

Some of the important changes put into effect by the latest announcement are, the reduction of the maximum price of No. 1 busheling from $35 to $32; the permission to charge $5 per ton for preparing cast scrap to cupola size; an advance of $5 per ton for cast iron borings and machine turnings for consumption in chemical plants; a reduction from $30 to $25 for heavy axle and forge turnings; an advance to $35 for malleable scrap for foundry use; fixing of a new grade of low phosphorus scrap at $35 a ton, and of special sheared wrought at $40 a ton.

No specific reference is made to the 3½ per cent commission which dealers in the past have been allowed over and above the maximum prices.

The announcement is dated Feb. 21, when the new schedule became effective.

NO. 1.—NO. 1 HEAVY MELTING STEEL:

No scrap to be used for remelting into steel shall be dealt in at a price in excess of the maximum base, $30. This shall include all steel, wrought iron, cast iron car wheels, malleable scrap or other grades to be melted in basic open-hearth furnaces (except as noted in clauses 2, 3 and 4).

NO. 2. — LOW PHOSPHORUS STEEL SCRAP:

(a) To be used only in plants operating acid open-hearth furnaces, crucibles or electric furnaces. This grade, which shall consist of billet, bloom, bar and plate crop ends, axle butts and new mill plate shearings, ¼ inch thick and heavier, no piece to weigh less than 10 pounds, all in charging box shape and which will analyze 0.04 and under in both phosphorus and sulphur, may be dealt in at a differential of not exceeding $10 a ton over the base price of heavy melting steel. Maximum, $40.

(b) All other grades of low phosphorus steel scrap to be used in such plants, which will analyze 0.04 and under in both phosphorous and sulphur, may be dealt in at a differential of not exceeding $7.50 a ton above the base price of heavy melting steel. Maximum, $37.50.

(c) Special steel, for use in such plants, but which will not analyze under 0.04 in phosphorus and sulphur, may be dealt in at a differential of not exceeding $5 a ton above the base price of heavy melting steel. Such special steel shall include steel knuckles and couplers, rolled steel wheels, railway steel springs, carbon tool steel and similar material in quality and character, suitable for mills of this kind. Maximum, $35.

Note. — Material under this classification may not be dealt in for use by basic open-hearth plants using charging boxes at a price in excess of the maximum allowed for heavy melting steel ($30).

No. 3.—Steel Rails, structural steel or similar scrap which has been especially sheared to short lengths for use in cupolas, hand charging furnaces or for rerolling purposes may be dealt in at a differential of not exceeding $5 above the base price of heavy melting steel. Maximum, $35.

Note.—Material under this classification may not be dealt in for use by basic open hearth plants using charging boxes at a price in excess of the maximum allowed for heavy melting steel $30).

No. 4.—Standard section old steel tee rails, free from frog, guard and switch rails, 56 pounds a yard and heavier, 5 feet and over in length, suitable for and to be used only for rerolling purposes, may be dealt in at a differential of not exceeding $5 a gross ton over the price of heavy melting steel. Maximum, $35.

NO. 5.—NICKEL STEEL:

Nickel steel scrap, excluding turnings, and containing not over one-half of 1 per cent of chrome, may be dealt in at the maximum price of heavy melting steel plus a differential of not exceeding $4 a ton per unit on the nickel content.

NO. 6—NO. 1 RAILROAD WROUGHT:

(a) No. 1 railroad wrought scrap may be dealt in at a price of not exceeding $35 a gross ton.

(b) When wrought scrap is especially sheared or prepared for piling or faggoting purposes to lengths of not under 10 inches or over 24 inches, it may be dealt in at a differential of not exceeding $5 a ton over the base price of No. 1 railroad wrought, but this may not include short wrought or other material which has not been especially prepared. Maximum, $40.

(c) Wrought iron railroad angle or splice bars, iron or steel shafting, suitable for rerolling, old iron rails, iron boiler plate cut apart in sheets and rings, wrought iron bridge scrap cut apart and similar wrought iron suitable for making sides and bottoms for box piling, may be dealt in at a differential of not exceeding $5 over the base price of No. 1 railroad wrought. Maximum, $40.

(d) No. 1 yard wrought, railroad track scrap and short wrought, also wrought iron and steel pipe, when 1 inch and over in diameter, 2 feet and over in length, free from dirty, painted, enameled or coiled and bent material, may be dealt in at a maximum of $1 a ton under the base price of No. 1 railroad wrought. Maximum, $34.

(e) The commodity known in the trade as No. 1 busheling scrap, when suitable for and to be used only by mills manufacturing bar iron, may be dealt in at a maximum of $3 a ton under the base price of No. 1 railroad wrought. Maximum, $32.

(f) Ungraded wrought iron and steel pipe and tubes, steel boiler plate cut apart in sheets and rings, country wrought and soft steel mixed, may be dealt in at a maximum of $5 under the base price of No. 1 railroad wrought scrap. Maximum, $30.

No. 7. Iron and steel railway axles, arch bars and transoms, old locomotive tires smooth inside and sheet bar crop ends, when suitable for and to be used only for rerolling purposes, may be dealt in at a differential of $12.50 a ton over the base price of No. 1 railroad wrought. Maximum, $47.50.

NO. 8.—CAST IRON SCRAP:

(a) All cast iron scrap, whether broken or unbroken, including unbroken cast iron car wheels, may be dealt in at a maximum price not exceeding that of heavy melting steel, except as noted in clause b. Maximum, $30.

(b) Cast iron scrap in cupola shape, in pieces not exceeding 150 pounds, including broken cast iron car wheels, when suitable for and to be used only in cupolas or in puddling furnaces, may be dealt in at a differential of not exceeding $5 a ton over the maximum price of heavy melting steel. Maximum, $35.

(c) Malleable scrap of all kinds may be dealt in at not exceeding the maximum price of heavy melting steel. (Exception as noted in clause d). Maximum, $30.

(d) Malleable scrap in cupola shape, in pieces not over 150 pounds, when suitable for and to be used only in malleable works, may be dealt in at a differential of not exceeding $5 a ton over the maximum price of heavy melting steel. Maximum, $35.

Note.—Cast iron scrap or malleable scrap of any description may not be dealt in for use by basic open hearth furnaces at a price in excess of the maximum allowed for heavy melting steel ($30). Maximum, $20.

NO. 9.—MACHINE SHOP TURNINGS:

(a) The term "machine shop turnings" shall apply to all grades of iron or steel turnings except as noted in clauses b and c.

(b) Heavy axle and forge turnings, or their equivalent, may be dealt in at a price of not exceeding $5 a ton over the maximum price of machine shop turnings. Maximum, $25.

(c) Nickel steel turnings containing not over one-half of 1 per cent of chrome may be dealt in at a price of not exceeding $5 a ton over the base price of machine shop turnings, plus a differential of not exceeding $4 a ton per unit on the nickel content. Maximum, $20.

NO. 10.—CAST IRON BORINGS:

This classification shall cover all grades of cast iron borings (except for the special purpose indicated in clause 3).

(a) Cast iron borings and steel turnings, when suitable for and to be used only by chemical plants or plants operating for purposes other than the remanufacture into iron or steel products, may be dealt in at a differential of not exceeding $5 above the base price. Maximum, $25.

All the above prices and differentials are per gross ton of 2240 pounds, and in all cases include all freight and charges delivered f. o. b. cars at the consuming mill.

Mixed Condition

As to Car Supply Prevails in Refractories Industry—Output Curtailed

Shortage of cars is holding up shipments of refractories in Pennsylvania districts, and there does not seem to be any sign of immediate improvement in this direction, despite the moderated weather conditions that have been prevailing for almost three weeks. Embargoes also continue to be put into effect and lifted intermittently, and difficulty is being experienced in obtaining supplies of lime and coal. Deliveries are deferred all the way from one to six months. Some producers are in a position to take new business, although the majority of them are so fully committed that they are unable to consider inquiries coming out.

It is estimated that operations of kilns in the Pittsburgh district are about 70 per cent of capacity. Prices quoted remain unchanged.

An Ohio producer of fire brick reports that the past week has brought the removal of several embargoes and that the further anticipated improvements in transportation facilities contribute to an outlook which is the most promising in weeks. This company is practically unable to ship from its Pennsylvania plant, however, where the situation is so acute that only one car has been received on its siding during a period of 15 days. In Ohio the situation is far from normal, but apparently much better than that of Pennsylvania. One Ohio maker states that following the sharp curtailment of production made a few weeks ago, plant operation is now only 50 per cent of normal.

Refractories

(Per 1000 f. o. b. works)

FIRE CLAY BRICK.

(First Quality)

Pennsylvania	$45.00 to 55.00
Missouri-Illinois	55.00 to 65.00
Ohio	45.00 to 50.00
Kentucky	45.00 to 55.00
New England	55.00 to 65.00

FIRE CLAY BRICK

(Second Quality)

Pennsylvania	$40.00 to 50.00
Ohio	35.00
New England	48.00 to 58.00

SILICA BRICK.

Pennsylvania	$50.00 to 60.00
Chicago	55.50 to 65.50
Birmingham	45.00 to 55.00

MAGNESIA BRICK

(Per Net Ton)

9 x 4½ x 2½	$135.00 to 160.00

CHROME BRICK

(Per Net Ton)

9 x 4½ x 2½	$135.00 to 140.00

BAUXITE BRICK

(Per Net Ton)

55 per cent	$40.00 base
76 per cent	100.00 base

Britain Advances Prices

Great Britain has established new prices on bar iron and copper sulphate, according to advices from Consul General Skinner at London. The bar iron price was increased from $68.83 per ton, f.o.b. works, to $69.45 per ton for standard quality, ordinary sizes and merchant lengths. This price became effective Feb. 15. On copper sulphate the following quotations have been established for deliveries in the months named: $238.28 per ton, January and February; $244 per ton, March and April, and $253.72, May to August, inclusive.

Consul Skinner also reports that he has arranged, after futile efforts for better concessions, for the release of all American goods detained under bond on condition they be sold by the London chamber of commerce under the terms of cost plus 10 per cent to be paid to the importers and the excess to go to charity. This decision of the imports controller at London is not compulsory and election may be made to continue the goods under bond.

To Build Steel Ships

Exclusively devoted to complete steel ship construction, a shipyard will be established at Green Bay, Wis., by the recently organized Northwest Engineering Works, Inc. H. G. Barkhausen, who for many years was affiliated with the Interstate Coal & Dock Co., and L. H. Barkhausen, formerly with Greiling Bros. Co., formed the new company and purchased the yards, plant and business of the Hartmann-Greiling Co. from Carl Hartmann. The latter will remain with the company for the present but contemplates opening an office and warehouse in Green Bay for jobbing new and used machine tools and foundry equipment. Shipbuilding capacity will be trebled so that six ships may be under construction at one time. Machine and boiler shops will be enlarged and a new shop designed for the fabrication of steel for ship construction will be added. The company plans to lay the keels for two boats immediately.

The Carlin Steel Products Co., Philadelphia, which recently took a contract from the government for 1,150,000 shrapnel heads, has sublet this to the Endicott Forging & Mfg. Co., Endicott, N. Y.

Explosive Making

Exerts Dominating Influence on Market for Coal Tar Products

New York, Feb. 23.—The outlook in benzol is uncertain due to lack of definite knowledge as to whether and how soon the ordnance department of the army will begin to requisition this product for picric acid. Present dependence on toluol, it is felt, will not long be considered practicable, since the output is inadequate to our high explosives needs, and the latter are expected to increase right along. In the meantime stocks of benzol are growing large. While current sales involve large quantities, they are not sufficient to strengthen the market. The latter may be quoted at 35 to 40 cents per gallon. It is certain, however, that large contracts could be closed considerably lower.

In toluol, the shortage is most acute and manufacturers of dyestuffs who are depending upon old contracts are having great difficulty in securing deliveries. The output is not more than 60 per cent of normal. Hence between old contracts by manufacturers of high explosives and the requirements of the government, which are being allotted as fast as supplies become available, there is very little toluol for other purposes than the manufacture of trinitrotoluol.

In solvent naphtha the market has decidedly improved as to statistical position. Difficulty was encountered this week in securing quotations on a spot inquiry for 200,000 gallons. It was found that total stocks at producing plants are not much in excess of this figure. Both spot and contract continue to be quoted at 18 to 22 cents per gallon.

Coke Oven By-Products

Spot

Per Gallon at Producers Plant

Pure benzol	$0.35 to .40
Toluol (nominal)	1.70 to 1.80
Solvent naphtha	.18 to .22

Per Pound at Producers Plant

Phenol	$0.52 to .55

Per 100 Pounds at Seaboard

Sulhate of ammonia (nominal)	$5.10 to 5.35

Contract

Per Gallon at Producers Plant

Pure benzol	$0.35 to .40
Toluol	nominal
Solvent naphtha	.18 to .22

Per Pound at Producers Plant

Phenol nominal.

Per 100 Pounds at Seaboard

Sulphate of ammonia	nominal

Will Limit Industrial Use of Coal

Fuel Administration Directs That Requirements for Present Year be Carefully Gaged and Production for 1919 Delivery be Restrained—Policy of Reducing Nonessential Output Will Be Continued Vigorously

WASHINGTON, Feb. 26.—Announcement of the fuel administration that it has returned to the policy of curtailing nonessential industries came almost simultaneously with another that the fuelless Mondays have been discontinued in New England. These were the most important developments in the fuel situation last week and are regarded as frank admission of the failure of fuelless days to produce the desired results as economic fuel conservers.

In announcing that the production of window glass this year will be cut to a saving of 500,000 tons of coal which, with less glass to be transported, will save the equivalent of 18,000 carloads of freight, the fuel administration says it has taken "the position that in the present condition of shortage no fuel must be used to manufacture any greater quantity of finished products than will be needed this year; that factories cannot be permitted fuel, transportation and labor to manufacture a surplus of products to be piled up for sale next year."

Consumption Will be Limited

The administration is conferring with representatives of industries to learn the requirements of each this year. It is the plan to agree on a percentage production satisfactory to manufacturers and labor for 1918's needs only. "It is through these methods of reducing consumption that a repetition of this year's shortage is to be absolutely prevented", the administration says. It is through this system of scientific limitation that the fuel administration expects to supplement the production of coal this year.

While fuel has been moving more freely into New England under the coal conservation plan of fuelless days which had been continued there longer than elsewhere in the Union, the main reason for discontinuing the order was that labor, working only five days east of the New England-New York state line, was migrating westward where six days' employment was offered. This movement began to be felt in New England factories and it was only after manufacturers strenuously objected that the ban was lifted.

"This flow of labor applies with particular force to western Connecticut, which is in such close contact with corresponding industrial activity in New York state," says a letter from the New England administrators. "We have accordingly decided that pursuant to the authority conferred on us we will permit our industries to continue in operation as best they may according to their individual fuel conditions without interference from the application of any general rule."

Window glass production this year was scheduled for 8,000,000 or more boxes, according to the fuel administration. The actual requirements are said to be less than 5,000,000 boxes. Competitive conditions would lead to this overproduction, it was pointed out, and Dr. Garfield said he has obtained practically a 100 per cent agreement with the window glass manufacturers to curtail their production in the interests of each other. To make it effective he accordingly issued an order, violation of which may invoke the penalties of the fuel bill.

Bituminous Distributor Named

A. W. Calloway, president of the Terminal Railroad & Coal Co., Pittsburgh, and the Davis Coal & Coke Co., Baltimore, has been appointed distributor of bituminous coal by the fuel administration as a member of the staff to be established by J. D. A. Morrow, manager of apportionment and distribution under Dr. Garfield. Manager Morrow and Distributor Calloway next Friday will meet with railroad officials and members of the staff of Director General McAdoo and take up the question of supplying railroads with fuel this year. This is expected to be an important conference.

Rifle Production Reaches Record Level

WASHINGTON, Feb. 26.—Production of army rifles is exceeding estimates of ordnance officers despite inability to obtain desired deliveries of steel, caused by fuel shortage, and a scarcity of skilled labor, Secretary Baker declares in an official war office statement. Since war was declared more than 700,000 rifles have been manufactured and lately, according to the secretary, production has been better than 70,000 a week. This rate is said to be sufficient to arm 14 army divisions each month.

Figures given by the secretary show that in the week ending Feb. 9 three arms manufacturing companies and two government arsenals turned out 71,192 rifles, 46,792 of which represent the week's production of Springfield and modified Enfield rifles. The remainder, 24,000, was manufactured for Russian account, but has been requisitioned by the American army. In the week before 50,872 Enfield and Springfield and 21,280 Russian guns were produced.

Record Production Claimed

This, the war department believes, is "a greater number of rifles than any nation ever produced in equal time." The production at that time, weekly, was "four times as great as the weekly production of rifles in Great Britain after ten months of war, itself an excellent achievement, and twice as large as the production of Great Britain after two and a half years of war."

The companies manufacturing these rifles are the Winchester Repeating Arms Co., the Remington Arms Co. and the Eddystone Munitions Co. The two government plants engaged in this production also are the Springfield armory and the Rock Island arsenal. These producers, up to Jan. 1, manufactured 345,460 rifles, according to Senator Weeks. This was an average of 1,365 daily, which compares with a daily production of 13,031, almost 10 times as much, in the two weeks given by the secretary.

Senator Weeks said the Eddystone company's production on Jan. 1 was

500 daily or a total of 128,124; the Springfield armory 350 daily, or a total of 87,324; Winchester, 300 and 78,538; Rock Island, 115 and 17,060; and Remington, 100 and 34.414. The secretary's announcement contains no similar tabulation for any period, but he said the 700,000 guns manufactured since April 6 is 100,000 more than were available when we went to war, giving a total today of more than 1,300,000 service rifles which include 160,000 Krags, 280,000 training rifles, 100,000 Russian guns and 20,000 Ross rifles.

Huge Force at Work

The ordnance bureau has spent or obligated itself for $400,000,000 for rifles and ammunition, the secretary said. This is keeping 200 officers, 80,000 men and 10,000 exclusively engaged in their manufacture, according to the statement, and is under the administration of the small arms division, ordnance bureau, of which Col. John T. Thompson is chief. Under him are Maj. L. P. Johnson, his assistant; Maj. J. T. Kenyon, chief inspector of small arms; Lieut. Col. J. E. Monroe, chief inspector small arms ammunition; Lieut. Col. Charles Elliott Warren, procurement section; Maj. E. A. Shepherd, finance section; Maj. Hayden Eames, production section; Maj. M. G. Baker, purchase section; and Maj. L. O. Wright, engineering section.

Secretary Baker says the actual needs of the army have been met and while there has been delay in satisfying these requirements the final results justify the tardiness. Decision to modify the Enfield rifle, being manufactured for England when this country went to war, came after consideration of the need of preserving manufacturing organizations, the secretary said. The department "was conscious of the responsibility resting upon the decision to standardize the rifle, but estimated that the standardizing of parts would compensate the lost time when manufacturing was brought to quantity basis." The secretary says present production fully confirms the "correctness of that calculation."

Fuel Oil Industry is Put Under License Control

Washington, Feb. 26.—In consequence of the pending fuel oil shortage, President Wilson has issued a proclamation which places under license as of Feb. 11 all manufacturers and distributors of fuel oil with annual sales of more than 100,000 barrels. Mark L. Requa, head of the oil division of the fuel administration, has charge of oil distribution which so far does not include gasoline and kerosene. Fuel Administrator Garfield has compiled the following list of activities which will have the preference in receiving oil supplies. Railroads and bunker fuel; export deliveries or shipments for the United States army or navy; export shipments for the navies and other war purposes of the allies; hospitals where oil is now being used for fuel; public utilities and domestic consumers now using fuel oil, including gas oil; shipyards engaged in government work; navy yards; arsenals; plants engaged in the manufacture, production and storage of food products; army and navy cantonments, now using oil for fuel; industrial consumers engaged in the manufacture of munitions and other articles under government orders.

Lack of transportation facilities is given as the chief reason for the inauguration of the licensing system and the use of tank cars and tank ships for other purposes has contributed to that shortage. Because of his wide experience in and intimate knowledge of the oil fields, T. A. O'Donnell, Los Angeles, has been appointed by Oil Director Requa to take charge of the oil production section.

Will Direct Licensing of Imports and Exports

Washington, Feb. 26.—Henry B. Van Sinderen has been made director of exports by the war trade board, succeeding C. A. Richards, who has been appointed chairman of the contraband committee, a new division of the Board. Mr. Van Sinderen, formerly with the American Trading Co., New York, has been assistant director under Mr. Richards. Mr. Richards' committee will be a general supervisory board over the import and export sections of the war trade board, according to popular interpretation of the order creating the division. It is to expedite the issuance or refusal of either import or export licenses and to act as the appellate body of the two license divisions.

Under Mr. Richards will be P. Chauncey Anderson, counsel of the import bureau; W. Kingsland Macy, assistant to Beaver White, the food administration's representative on the board; George J. McCarty and Richard A. Strong. G. K. Bell is secretary of the committee. Edwin F. Gay, dean of the Harvard school of business administration, selected by the shipping board to adjust import problems to available tonnage, has been made a member of the war trade board, the second member named by the shipping board. The other is Frank C. Munson. The trade board recently created the position of controller and named Herbert N. Strauss to the place.

Change Administration of Nonferrous Metals

Washington, Feb. 26.—Appointment of Pope Yeatman, New York metallurgist and consulting engineer, as director of the nonferrous metals division of the war industries board, is expected to be given heartier acclaim in the trade than was the selection of his predecessor, Eugene Meyer Jr., New York. Mr. Yeatman has been more closely identified with the production of metals than Mr. Meyer. For 10 years he was connected with the Guggenheim interests. He has been assisting Mr. Meyer, who has been made assistant commissioner on the staff of B. M. Baruch, chief of the raw materials section of the war industries board. Mr. Meyer has been engaged in special work for Secretary Baker and will continue for some time.

Notice was sent to the trade by Mr. Baruch last Thursday that immediately upon their receipt the zinc prices announced a week ago would become effective. This procedure differs from that of other price-fixing announcements under which the prices became effective upon their promulgation. Under this new plan delay in the mails may work to the advantage or disadvantage of the particular recipients, as the case may be.

At the office of L. L. Summers, director of chemicals and explosives, it was stated last week that the sulphuric acid supply will be adequate for all requirements if transportation facilities and labor supply are available. It was said that the reported commandeering of certain quantities of the acid by the government was only an interpretation of the general custom of government orders taking precedence over all others.

Japan's Iron and Steel Imports Are Heavy

Washington, Feb. 26.—Increases in Japan's foreign commerce in 1917 are reflected in her importations of iron and steel rather than of nonferrous metals. The value of iron and steel ingots, blooms, billets and slabs admitted to the empire was more than $12,500,000, an increase of $4,500,000 over 1916. Bars, rods, sheets, plates, wire, etc., advanced $50,275,000 over the $33,106,000 valuation of the year before. Imports of tin exceeded 1916

by nearly $1,000,000, aggregating $1,889,000. Construction materials admitted were valued at $4,850,000, more than eight times that of the preceding year. Machinery imports reached $15,437,000 compared with $8,135,000 in 1916.

Antimony imports dropped from $3,500,000 to $2,571,000. Lead fell from $3,750,000 to $2,900,000 and nickel declined from $1,000,000 to $498,000. Bronze and brass also fell off to $5,000,000 from $7,000,000. Ore receipts advanced from $8,081,000 to $8,533,000 and ammonium sulphate imports more than doubled, reaching $1,430,000. Copper exports, showed gains, as did zinc, the former reaching $43,750,000, $10,750,000 more than in 1916, and the latter going to $10,470,000 from $9,625,000.

Japan's total foreign commerce in 1917 was $1,315,441,000, divided as follows: Imports, $516,343,000; exports, $799,098,000. These three sums compare with $839,122,000, $377,079,000 and $562,043,000 in 1916.

Rulings Give Protection to Enemy Creditors

Washington, Feb. 26.—New financial rulings of the war trade board provide for protection of persons holding enemy paper; authorize payment of patent office fees on patents, trademarks, etc., of an enemy by any one holding power of attorney granted by the enemy, and permit collection of coupons for foreigners without first obtaining license, all with certain restrictions, however. The first ruling authorizes "all persons in the United States holding notes, checks or drafts, upon which an 'enemy' or 'ally of enemy' appears, or the handling of which involves in any way trading with, or for, or on behalf of, an 'enemy' or 'ally of enemy', to perform such acts as may be necessary to perfect their right against those secondarily liable on such notes, checks or drafts, in the event that acceptance or payment is refused", but only under license from the board.

Approval of Alien Property Custodian Palmer must be had before payment can be made of "United States patent office fees requisite for the filing, prosecution, registration and preservation of patents, trademarks, prints, labels or copyright of an 'enemy' or 'ally of enemy', by any person within the United States, where such person is the holder of a power of attorney granted by such 'enemy' or 'ally of enemy'." The war trade board authorizes "banks and others having coupons to collect, which were due prior to Jan. 1, 1918, for foreign individuals, firms, corporations or others, to make such collections without obtaining license from the war trade board or authority from the federal reserve board", on condition that the funds received, if believed to be the property or in the interest of an "enemy" or "ally of enemy", be held in separate account under notice to Mr. Palmer.

Capital Odds and Ends

The increase of 470 in the number of deaths in the coal mining industry last year over 1916, the total being 2695, was due to spasmodic speeding and retarding of coal production because of car shortages and uncertainties, and to the substitution of inexperienced for experienced miners called to arms, according to Secretary Lane.

* * *

Complaint has been made by the Independent Bridge Co., Pittsburgh, against the Pennsylvania railroad that an overcharge of $173.62 on a consignment of wrought iron annealing boxes to the Phillips Sheet & Tin Plate Co., Weirton, W. Va., was due to an existing rate of 7.9 cents while an adequate rate of 4.2 cents applies on cast iron annealing boxes.

* * *

A dealer in France has placed an order for $48,250 worth of alarm clocks manufactured in the United States. There is said to be a great shortage in Europe, and that if these clocks prove satisfactory many more will be purchased here.

* * *

Bids received by the post office department for five airplanes for aero mail service were as follows: United Eastern Airplane Co., delivery 80 days, $59,000; Standard Aero Corp., 63 days, $68,000, and West Virginia Aircraft Co., 90 days, $72,500.

* * *

The George A. Fuller Co. has been awarded a contract to construct an aviation concentration camp on the James river near Richmond, Va., at a cost of nearly $4,000,000.

* * *

The war department has announced it will not undertake the redistilling of confiscated liquors for the recovery of alcohol. It is said the expense would be too heavy when it is realized that only 5 per cent of the liquor is thus recovered.

* * *

The department of justice has determined that the $400,000 fire at the quartermaster's depot at Port Newark Terminal, N. J., Jan. 26, was due to gross carelessness on the part of contractors constructing the wharf and has recommended civil proceedings to recover damages.

* * *

The welfare plan of the army and navy is to be extended to the shipyards for the entertainment and enlightenment of the shipbuilders.

* * *

In his latest plea for conservation of ammonia, Food Administrator Hoover declares the United States will require 20,000,000 pounds this year. He also says that one pound of ammonia is sufficient for 20 hand grenades. Mr. Hoover is going to ask large consumers of ammonia to report monthly.

* * *

The bureau of foreign and domestic commerce is urging American manufacturers to prepare for Serbian trade after the war. The board says among the chief needs will be demands for pig iron, iron and steel bars, tin plate, galvanized sheets, rails, nails, chains and many fabricated products.

* * *

The United States government is planning the constructon of an acetic acid plant at a cost of nearly $6,000,000. A site at Shreveport, La., is under construction as is also a plan to build an addition to an existing Canadian plant.

* * *

Under arrangement said to be made with the war trade board, domestic graphite will be substituted largely for that now imported from Madagascar and Ceylon.

* * *

Carriers have asked restriction in routing pig iron by way of the Louisville & Nashville railroad, Gadsden, Ala., and the Tennessee, Alabama & Georgia railroad from Oxmore, Ala., to Boyce, Tenn., and Chattanooga.

* * *

The Denver & Rio Grande railroad asks cancellation of the carload rate of 8.25 cents per 100 pounds on manganese ore, Red Cliff, Belden and Rock Creek to Pueblo, Minnequa and Blende, Colo.

* * *

The Delaware, Lackawanna & Western railroad seeks a rate of $2.60 per ton on pig iron, carload, from designated points on its line to destinations on the Grafton & Upton railroad.

* * *

The Missouri Pacific railroad asks an increase in the class and commodity rates, Alton and Edwardsville, Ill., to stations on its line, South Point to Osage, Mo., to the East St. Louis-Jefferson City basis, 45 cents per 100 pounds first class and 14.5 cents per 100 pounds agricultural implements.

* * *

The Pennsylvania railroad has applied for cancellation of the rates on rolling mill rolls, iron and steel, Allegheny and Pittsburgh to New Philadelphia, O., by way of Massillon and the Baltimore & Ohio railroad.

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

POPE YEATMAN, consulting mining engineer, 111 Broadway, New York, has been placed in charge of the nonferrous metals department of the raw materials division of the war industries board, succeeding Eugene V. Meyer Jr., who retains his place with the war board, but who now is engaged on special service for the secretary of war. Mr. Yeatman takes up his new duties with a comprehensive knowledge of what these duties involve, as he had been acting as consulting engineer to the board ever since midsummer. In this capacity he gave the board much technical advice, especially with regard to the fixing of prices for nonferrous metals. Mr. Yeatman is regarded as one of the highest authorities in the world on mining affairs and properties. He was born in St. Louis in 1861 and, following his graduation from Washington university, St. Louis, in 1883, he engaged in mining work in Colorado and Mexico, later transferring his activities to Africa, where he acted as manager of a number of important properties. Later he returned to this country and was for 10 years connected with the Guggenheim interests. He left his position as chief consulting engineer for the Guggenheims about two years ago to take up independent practice as consulting mining engineer, in association with Edwin S. Berry, who now is a captain of a company of the Twenty-seventh engineers, the mining regiment. Messrs. Yeatman and Berry have given up their offices and their practice until after the war. Mr. Yeatman will have his headquarters in Room 813 Council of National Defense building, Eighteenth and D streets, Washington, where he will move his office staff.

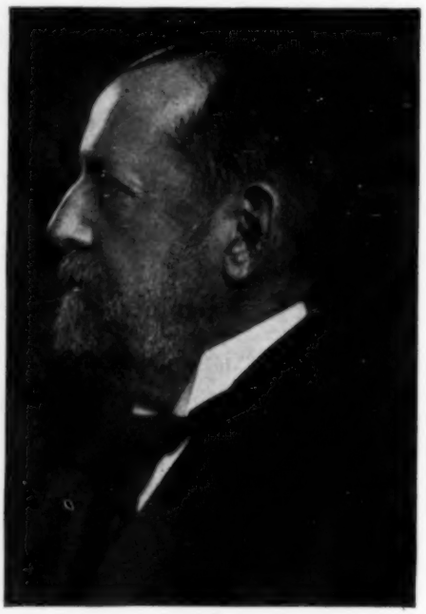
C. B. Lihme, Chicago, has been elected president of the Matthiessen & Hegeler Zinc Co., La Salle, Ill.

Charles H. Moyer resigned recently as vice president of the Pennsylvania Shipbuilding Co., Philadelphia and Gloucester, N. J.

O. M. Hibler, with the Mahoning National bank, Youngstown, O., has been made treasurer of the Liberty Steel Co., to succeed Edward F. Clark, who has served as both president and treasurer since the company's organization. Mr. Hibler will assume his new duties April 1.

John E. Bradley, president of the Osgood Bradley Car Co., Worcester, Mass., is enjoying a vacation at Palm Beach, Fla.

William A. Viall, works manager of the Brown & Sharpe Mfg. Co., Providence, R. I., was recently elected president of the Rhode Island society, Sons of the American Revolution.



POPE YEATMAN

F. C. Hossie recently sold his interest in the J. R. Stone Tool & Supply Co., to become president of the General Mfg. Co., Detroit, tools and jigs.

E. F. Carry, president of the Haskell & Barker Car Co., Michigan City, Ind., was recently elected a director of the Continental & Commercial National bank.

William M. Brouse, a prominent business man of Brockville, Ont., will move to Ottawa, having been appointed assistant manager of the International Harvester Co., there.

Ernest L. Teich, who for many years has been head of the pattern-making department of the P. & F. Corbin division of the American Hardware Corp., New Britain, Conn., has been made mechanical superintendent to succeed William S. Trask, resigned.

Charles F. Olin has been appointed a member of the department of public information, and expects to be called to Washington. He is advertising manager for the New Departure Mfg. Co., Bristol, Conn.

John K. Graham has been appointed general manager of the Sun Shipbuilding Co., Chester, Pa., having resigned his position as vice president and general manager of the Virginia Bridge & Iron Co., Roanoke, Va.

Charles H. Gifford has been appointed vice president and general manager of the Southworth Machine Co., Portland, Me. He was formerly vice president of the American Blower Co., Detroit.

J. L. Price, who for some time has been assistant to the chairman of the board of directors of the Chicago Pneumatic Tool Co., Chicago, was recently elected vice president in charge of finances.

Waldo C. Bryant, president and treasurer of the Bryant Electric Co., Bridgeport, Conn., was recently named civilian production manager of the ordnance department for Connecticut and western Massachusetts, with headquarters at New Haven, Conn.

D. McCall White, vice president of the Cadillac Motor Car Co., Detroit, has been named one of the three members of the aircraft board's supervisory committee to pass upon improvements in the liberty aircraft engine.

Edward P. Quinn was appointed superintendent of the foundry department of the Bilton Machine Tool Co., Bridgeport, Conn., upon his resignation as manager of the Turner & Seymour Mfg. Co. foundry at Torrington, Conn.

Griffith Coit, formerly purchasing agent for the Lake Torpedo Boat Co., Bridgeport, Conn., has been made general purchasing agent for the American Shipbuilding Corp. and the Chester Shipbuilding Co. His offices will be in the Finance building, Philadelphia.

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

SIDNEY J. JENNINGS, who was elected president of the American Institute of Mining Engineers at that organization's 116th meeting, held in New York last week, is vice president and director of the United States Smelting, Refining & Mining Co., Boston and New York, and for some time had charge of exploration and mining investment for that company. He was vice president of the institute the past year. At the institute's 1917 meeting, he was defeated for the presidency on a letter ballot by Philip N. Moore, St. Louis, whom he now succeeds. As a consulting and mining engineer, he has had a wide experience, his work in the South African Transvaal gold fields attracting much attention, since he spent many years there. He becomes head of the American Institute of Mining Engineers under auspicious circumstances, since during 1918 geologists, metallurgists and mining engineers the country over will be called upon to conserve and utilize to the best possible advantage, the country's metal resources.

John W. Harrington, of the Harrington & Richardson Arms Co., Worcester, Mass., is doing war service in Paris, driving a motor truck, according to letters received.

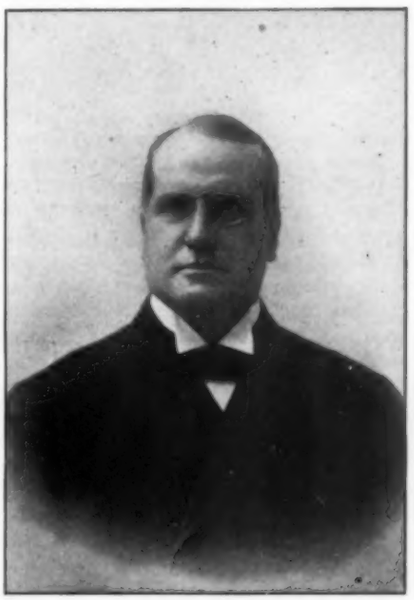
Thomas G. Bennett has been elected president and treasurer of the Winchester Repeating Arms Co., succeeding Winchester Bennett, who is to take up special work for the company.

R. H. McNall, who as president of the Gilbert & Barker Mfg. Co., gas and fuel oil furnaces and oil storage apparatus, has maintained offices in New York, will until further notice have his headquarters at the works office, Springfield, Mass.

Roger W. Babson, president, Babson's Statistical Organization was recently made chief of the industrial relations division of the commission on public information. He will inform manufacturers as to the status of the labor division's war work.

Lester J. Adams, Lewiston, Me., district agent for the Graton & Knight Mfg. Co., Worcester, Mass., manufacturer of leather belting, has been appointed a second lieutenant in the ordnance department and has reported for duty at Washington.

Earl B. Morgan, safety engineer of the Norton Co., Worcester, Mass., for two years in charge of the safety engineering department has resigned and after March 1 will be affiliated in a similar capacity with the Liberty Mutual Insurance Co., Boston, specializing in workmen's compensation insurance. Prior to joining the Norton organization, he had charge of the safety engineering and employment departments of the Commonwealth Steel Co., St. Louis.



SIDNEY J. JENNINGS

Jesse G. Vincent, affiliated with the engineering staff of the Packard Motor Car Co., Detroit, and who was one of the designers of the Liberty motor has been promoted to the rank of lieutenant-colonel as a recognition of his services with the war department.

William F. Vosner, formerly office manager in New York for the Midvale Steel & Ordnance Co., is now general manager of sales for the Donner Steel Co., Buffalo, having resigned his New York connection Feb. 1.

Clark H. Tenant, who has been affiliated with large machinery and foundry concerns in West Allis, Wis., and Milwaukee, for several years, has been made assistant general superintendent of the naval ordnance works, East Moline, Ill., established by the Root & Vandevoort Co.

John C. Spence, superintendent of the Norton Grinding Co., Worcester, Mass., was recently elected president of the Superintendents' club connected with the Worcester branch of the National Metal Trades association. The members of the club will be the guests of the Simonds Mfg. Co., Fitchburg, Mass., March 14.

C. E. Middleton, who recently succeeded Walter S. Bickley, retired as first vice president of the Penn Seaboard Steel Corp., Philadelphia, has charge of ingot and plate output. H. J. Klaer, formerly general manager, succeeds Mr. Middleton, as second vice president and will have charge of the production of castings.

Lieut. W. H. Chapman, who graduated from Princeton university and became research engineer for the Norton Co., Worcester, Mass., has been ordered to France as a member of a commission of 10 under command of Major Ulian Collidge, formerly of the Harvard university faculty. It will make an investigation and research in aerial bombing.

Julius S. Holl, who was recently appointed assistant head of the department of shipyard volunteers of the United States shipping board, was advertising manager for the Link-Belt Co., Chicago. He has been active in the enrollment of 250,000 volunteer skilled workers for shipyards and has an office at 207 National Theater building, Washington.

Colonel Charles N. Monsarrat, prominent Canadian bridge engineer, has been elected a director of the Canada Foundries & Forgings Co. In 1889 he became structural draftsman for the Canadian Pacific railway and eight years later was made engineer in charge of designing and erection of important structures in British Columbia and elsewhere. Later he became engineer of bridges, but resigned in 1911 when he was appointed chairman and chief engineer of the Quebec Bridge commission.

Northwest Teeming With Industry

Shipbuilding is Foundation for Tremendous Activity of Iron and Steel and Auxiliary Plants—Many New Yards Being Built—New Steel Plant in Prospect —Market Conditions in Seattle and Vicinity

SEATTLE, Wash., Feb. 21.—The present high tide of industrial activity here is founded upon the shipbuilding industry which has come to be of first consequence, employing in Seattle alone at the present time approximately 23,000 men. This number will be greatly increased during the coming months through the efforts of the government. It is quite likely that before the summer is over at least 30,000 men will be employed in Seattle yards. Steel shipyards are doing the bulk of construction and will probably continue to do so, nearly four-fifths of the men now employed being attached to these yards. State Director Robert Moran of the public reserve service finds that the government call for enrollment is very satisfactory. Activity is also quite pronounced at Tacoma where both steel and wooden ships are under way.

The government is the chief builder of ships in northwest yards as well as elsewhere. At the present time yards at Seattle are under contract to construct for the shipping board 47 steel and 18 wooden vessels. The cargo fleet contracted for in this city aggregates 469,000 tons deadweight, 406,000 tons in steel ships and 63,000 tons in wooden ships. A recent contract was that awarded to the Skinner & Eddy Corp. for fourteen 8800-ton steel ships, making a total of 19 of this type which the company has contracted to construct for the government.

Many Shipyards Building

Numerous wooden ships are being constructed on Grays Harbor in southwest Washington and in the Oregon section with Portland as its center, approximately 14,000 men are employed in construction of both steel and wooden ships. The Standifer Construction Co. at the present time is building a large steel yard at Vancouver, Wash., where it will construct ten 9500-ton steel ships for the government. Vancouver, British Columbia, is witnessing an extensive revival in shipbuilding. C. J. Coughlan & Sons are getting under way in constructing a large yard for building steel ships and other activity is going forward. Everett, Wash., also is entering the list. The Norway Pacific Construction & Dry Dock Co. has been organized by M. G. Tholme, W. A. Stockbridge and others. A site for the plant has been purchased. Building ways will be provided for five steel and two wooden ships. This company has succeeded in placing orders in the east for steel and other equipment for its yard.

In the matter of operation, the larger yards of the northwest are running three shifts and allied industries such as machine shops and foundries are running three shifts in some instances and in others, two. Those running one shift would run more if they could get the men. The climate in the northwest is mild enough to permit continuous operation and no time is being lost on account of snows and other weather conditions.

Finance New Steel Plant

In the matter of materials for construction, the wooden ship presents no great difficulties as the timber is close at hand and transportation is ample. A thing which will have a tendency to stabilize steel shipbuilding in the northwest is the proposal to erect a large steel mill on Puget Sound. B. L. Thane, manager of the Alaska-Gastineau mine and others have financed the plant and taken every necessary step to secure its construction and operation. It is proposed to begin erection of this mill in the near future.

The coke situation which caused considerable worry during the past few weeks is somewhat improved, although the anticipated aid from the Crows Nest coal fields in British Columbia did not materialize. Properly selected coal from this field produces coke that compares favorably with Connellsville coke but it has not been forthcoming and it required the greatest skill and expedition on the part of those having the coke situation in hand to prevent the closing down of a number of foundries. While shipments of coke from the east are not arriving in a satisfactory manner, the Wilkeson or local supply is about back to the normal of production since a cavein occurred at the mine some weeks ago and by careful distribution and handling there will be no necessity for shutting down any of the foundries. The great majority of the latter are engaged almost exclusively on work that enters into the building of government ships. The Wilkeson coke does not meet the requirements alone but when the British Columbia field is placed in a state of development where the right quality of coal can be had, this fuel probably will be used in increasing quantities, thus reducing to the minimum the danger of having plants shut down in the future. The British Columbia field is not in a condition at the present time to supply this coal.

In the matter of pig iron the situation is not so serious. No. 1 foundry pig iron selling at $50 a ton delivered, based on the government price of $33, furnace. Very little pig iron is being produced in the northwest. The Pacific Coast Steel Co., Seattle, is producing a limited amount at Irondale, but this is consumed at its own plant. Iron therefore, must be shipped in from the east or south. Foundrymen state that they are now getting pig iron for the last half of the year at figures based on the government price. The price of good machinery cast iron scrap is running at $35. The price some months ago was as high as $40, but has been gradually going down. Scrap dealers were unable to hold the market at the high figure. The tonnage of steel scrap is furnished largely by the railroads. The government price prevails for all classified grades of steel scrap. There are small quantities that are furnished by the scrap dealers under the head of unclassified scrap, commonly called mixed scrap. These dealers bought steel scrap last fall as high as $34 a ton. Then the drop in the market came and the price became a matter of barter, ranging from $20 to $29 a ton. Good steel scrap is now being bought for $25 a ton.

Structurals for Shipbuilding

Such structural shapes as are being produced in the section are for domestic use, largely for shipbuilding, on all of which the government prices prevail. Very few licenses are being issued for export, which reduces exports to a very small matter. The only product in which there has been any considerable activity for export purposes is steel bars and during the past month there has been considerable inquiry, particularly from Japanese sources. A fair amount of tonnage was placed at 3.90c to 4c, 3.90c being the price the buyers were able to get from eastern mills. Local steel mills by being able to make quicker delivery, secured the better price. There is promise of more activity in this line as coast mills are filling up with orders and delivery is being placed further into the future. Imports are practically nil, the largest consignment

for several months being 1121 tons of pig iron from China last October.

On the point of labor there is a shortage of skilled mechanics which does not seem to be in the way of a quick adjustment. The trouble has been that so many of the men coming in are not skilled mechanics. The government is trying to relieve this situation by the drive now going on for shipyard workers. While there is some talk of a strike in the lumber camps and considerable expression in favor of increase of wages in the shipyards on account of the increased cost of living, there is no prospect of serious trouble. The government adjustment of wages dated from August, 1917, and the cost of living has gone up in Seattle 8¼ per cent since October 10. Under the government adjustment the wages were less than the demands of the worker's and less than the scale paid by the Skinner & Eddy Corp., one of the largest of the steel yards. Under the wages decided upon by the government for the shipyards machinists were to have $5.25 plus 10 per cent if they worked 48 hours a week; molders, $5.25, patternmakers $6.50, blacksmiths $5.35, coppersmiths $6, sheet metal workers, $6 and boilermakers $5.25, with the 10 per cent additional if they worked 48 hours during a week. On February 1, this 10 per cent automatically became a part of the wage scale. Now the molders outside the shipyards are getting $6 and better and in some instances asking for 10 per cent on this. Under the government scale, pattermakers would be entitled to $6.50 plus 10 per cent and many of them are drawing as high as 7.50 to $7.75. There are about 5000 men employed in the machine shops, foundries and miscellaneous shops of Seattle.

Castings Prices Have Risen

There is no uniform price for castings. Prices have risen generally but during the past two months the markets for gray iron machinery castings have not materially risen. It has been largely a matter of adjustment between seller and purchaser running from 7 to 8 cents per pound and on into higher figures depending on whether or not the work on the casting is complicated. Steel castings run all the way from 10 to 45 cents per pound, depending on the nature of the casting. As with the iron, there is no uniform price and it has been a matter of negotiation.

On the whole the industrial situation of the northwest is one that gives satisfaction. The growth has been remarkable as indicated by the bank clearings which are 97 per cent higher than they were a year ago at Seattle and by monthly payrolls at the shipyards which are in excess of $2,000,000. While Seattle and vicinity are witnessing the most activity, industrial growth is evident in an ever increasing degree in every port of the northwest and there is probably not a machine shop foundry or steel mill in the entire section that is not doing work to its full capacity in assisting the government in its war

To Spend Millions

After a tour of inspection of the Sparrows Point, Md., plant of the Bethlehem Steel Co., where $25,000,000 recently was expended on improvements, Charles M. Schwab stated that $25,000,000 more will be put into extensions. It is the intention, he said, to make the Maryland works one of the finest steel and shipbuilding plants in the United States. Mr. Schwab said that the object of his visit was to inspect the new improvements, especially the tin plate mill, which has been placed in operation since his visit last July.

Obituaries

ROWLAND G. HAZARD, 63, died of heart failure recently at Santa Barbara, Cal. He served as chairman of the board of the Semet-Solvay Co. and the Solvay Process Co., and was a director of several other large corporations. Other positions held by him at the time of his death were president of the Peace Dale Mfg. Co., Peace Dale, R. I., manufacturer of woolens; president of the Narragansett Pier Railroad Co.; vice president of the Mechanics National bank, Providence, R. I.; and director of the American Exchange National bank, New York City.

William H. Stewart, president of the Brownell Co., Dayton, O., manufacturer of boilers and engines, died recently at his home in Cincinnati, where he had other business connections, at the age of 65.

W. J. Miller, who built the Aurora, the largest wooden vessel on the Great Lakes, which was sunk in Lake Erie in 1905, died recently in Cleveland, where he made his home. He also built the first steel vessel constructed on fresh water, the steamer J. K. WHITE.

Edwin L. Gates, who was superintendent of the Worcester Wire Co., Worcester, Mass., since it was organized until it was absorbed by the American Steel & Wire Co., died recently at his home in that city after a long illness, at the age of 84.

George Summers, who for 10 years was salesman and steel statistician for the Carnegie Steel Co., going there from the Allison Mfg. Co., Philadelphia, but lately affiliated with the Federal Export Corp., New York, died recently at his former home in Philadelphia of pneumonia.

Floyd Clarke Coon, member of the firm of Hinds & Coon, dealers in mill supplies and beltings, Boston, died at his home in Brookline, recently. He was born at Cornwall-on-the-Hudson, N. Y., June 8, 1867, and moved to Cambridge, Mass., with his parents, when he was 13 years of age.

Arthur I. Jacobs, who for 15 years has been president and treasurer of the Jacobs Mfg. Co., Hartford, Conn., drill chucks, died in a hospital in that city recently, after a paralytic stroke. He was 59 years old and at the time of his death was likewise a director of the American Industrial Bank & Trust Co., in Hartford.

Lieutenant Walter L. Foulke, who before he joined the officers's reserve corps of the army, was manager of the C. Pardee Works, Perth Amboy, N. J., died recently at Camp Kelly, San Antonio, Tex. He was a graduate of Princeton university. Before his death, the commanding officer at the camp had recommended his promotion to the rank of captain.

H. A. Bayfield, Canadian wharf construction engineer, died recently at Ogden Point, B. C., where he was in charge of the government assembling plant for munitions. He at one time was engaged extensively in wharf construction at St. John, N. B., and other eastern ports, and more recently was government superintendent of dredges for British Columbia.

Fred H. Forman, who in 1901 became general sales manager for the Pittsburgh Steel Co., but who retired in 1913, because of the condition of his health, died recently of pneumonia in South Pasadena, Cal., after a short illness. His first business connection was as treasurer for the St. Louis Wire Co., and when the Consolidated Steel & Wire Co. was organized he was placed in charge of sales in its Louisville office, where he remained until the formation of the Pittsburgh Steel Co., about 17 years ago.

Chaser Plant

Begun by Ford at Detroit—First Keel Is Laid

Detroit, Feb. 26.—The Ford Motor Co. has begun the construction a shipyard on the site of its proposed blast furnace, on the River Rouge, which will cost $2,000,000 and employ 15,000 men. The plant will cover a square mile and will turn out a new type of submarine "chaser", built of steel, 200 feet long and equipped with a device for dropping depth bombs. They will be turned out at the rate of one a day and will be sent to salt water under their own power with full crews taken from a naval barracks to be maintained on the site which will house 2000 "jackies".

There will be five buildings, all of which are to be completed by May 10 or 75 days. The steel fabricating shop will be 150 by 450 feet and three assembling plants, 100 x 1500 feet each. Another building, housing the transfer tables, will be 100 x 1500 feet. They will cost $1,000,000. The plant is being erected from plans prepared by Albert Kahn, Detroit architect, who designed most of the buildings for the United States army cantonments and aviation fields.

Secretary of the Navy Daniels has been in Detroit several times inspecting the plants of the Ford company, as the guest of Henry Ford. Rear Admiral David W. Taylor, of Washington, head of the navy department bureau of construction, is also supervising the work.

The first vessel is being assembled at the plant while construction of the shipyard is under way. While the company is doing a vast amount of war work, it is continuing production of motor cars on a curtailed schedule. To what lengths the Ford company may go in war work can best be judged by the fact that the Detroit plant alone covers 350 acres with 88.32 acres of floor space. In addition there are 39 branches and assembly plants occupying, in the aggregate, 164 acres. Under normal conditions 46,000 men are employed in the various plants. In the last fiscal year the plant turned out 785,432 cars requiring 325,000 tons of steel; 3,500,000 lamps; 12,775,000 feet of vanadium steel shafting and axles; 88,016,880 feet copper tubing; 9,800,000 pounds of steel for magnetos; 6,300,000 square feet of galvanized metal for gas tanks; 59,458,000 square feet sheet metal for guards and fenders and 22,471,680 feet of tubular radius rods.

The Michigan Copper & Brass Co., of Detroit, operating one of the largest plants in the west producing thin gage copper and brass, has installed 16 sets of new high speed rolls in its new plant addition. This gives the mill a capacity of 60,000 pounds of thin gage metal a day, much of which is used in the motor car industry. The new additions represents an expenditure of $300,000. The company at its annual meeting Feb. 13 reelected all officers and directors, with D. M. Ireland, president, and Alonzo P. Ewing, general manager. Net earning on $991,350 common stock outstanding were $596,819 for 1917. Surplus is $1,434,000.

The Murphy Iron Works, Detroit, has let a contract to the Cooper-Widman Construction Co., for the erection of factory building 80 x 80 x 89 feet.

The Anderson Forge & Machine Co. is having a $10,000 forge and die factory erected by C. Keller & Co.

The Fisher Body Co., Detroit, has let a contract to W. E. Wood for the construction of an aeroplane factory at West End avenue and Fort street.

Quick Work

Done by Canadian Government in Starting Standardized Shipbuilding

Toronto, Can., Feb. 25.—No time has been lost by the Canadian government in putting into effect its recently announced policy of extensive ship construction. Contracts have been awarded for the building at the Canadian Vickers shipyards of a cargo steamer of 8200 tons dead weight, the keel of which will be laid before the end of the present month, and another of 4350 tons, dead weight, to be commenced shortly afterwards. These will be the first of a fleet of about 30 steamers varying in size from about 3000 tons dead weight to 8200 tons. The majority of the smaller sized vessels will be constructed on the yards bordering on the Great Lakes, so as to enable them to pass through the canal locks. Every ship will be built to a standard set of plans and specifications so as to facilitate construction, the important thing being to get the vessels in commission as quickly as possible. The marine department has succeeded in arranging for a full supply from the United States of all the plates and shapes which will be required until June, 1919. By that time it is anticipated that large rolling mills will have been established in Canada from which the subsequent demand will be supplied. With the exception of these plates and shapes every part of the ships will be of home manufacture.

An investigation by the marine department has shown that the following shipyards will be available at some time during the present year: Canadian Vickers, Montreal; Davie Shipbuilding Co., Levis, Que.; Collingwood Shipbuilding Co., Collingwood, Ont.; Polson Iron Works, Toronto, Dominion Shipbuilding Co., Toronto; Port Arthur Shipbuilding Co., Port Arthur; Midland Shipbuilding Co., Midland; British American Shipbuilding Co., Welland; Allis-Chalmers Co., Bridgeburg, Ont.; Nova Scotia Steel & Coal Co., New Glasgow, N. S.; Wallace Shipyards, Ltd., Vancouver, B. C., and Tidewater Shipbuilding Co., Three Rivers, Que. Some other shipyards at present fully occupied which may be available later are not as yet taken into account. There are at present only three berths vacant in these yards at which the Canadian government ships can be built, but a number of the contracts now on hand will be completed during the spring and summer leaving room for the government work.

J. Scollen, general manager for the Canadian Allis-Chalmers Co., announces that contracts have been signed for the building of four large lake steamers at that company's plant near Bridgeburg, Ont., which was formerly operated by the Canada Foundry Co. Electrical machinery is now being manufactured for the plant.

The Montreal Locomotive Works has received an order for 20 locomotives for the Chilean State Railway. This plant also is filling an order for 20 locomotives for the government railway of the South African commonwealth.

The government has created a war trade board consisting of Sir George Foster, minister of trade and commerce; Frank P. Jones, Montreal; John W. McConnell, Montreal; James H. Gundy, Toronto; Charles B. McNaught, Toronto, and Joseph Gibbons, Toronto, the latter representing the labor interests. The board is given wide powers including direction of licenses for export and import, supervision of all industrial and commercial enterprises to prevent waste, to investigate the stock of raw materials and products and direct distribution, and to work in co-operation with the Canadian war mission at Washington.

It is officially stated that the Steel Co. of Canada now is ready to start on the contract for 75 millimeter shells placed with it by the American government. It is also still busy on 4.5-inch shells. A good export trade is being done with South Africa, New Zealand and Australia.

To Fix War Labor Policy

Important Joint Conference of Representatives of Employers, Employes and Public Begins at Washington—Expect Far-Reaching Decisions

WASHINGTON, Feb. 25.—That capital and labor must change their minds and maintain a right attitude toward each other was the way Secretary of Labor Wilson summed up the first meeting of the joint conference of employers and labor leaders today. These parleys which may extend over a period of weeks, have for their purpose the elimination of much of the misunderstanding which exists between employers and the government and between employers and their workmen. The goal sought is an arrangement which will assure for the duration of the war maximum production of everything necessary to the maintenance of the American army at home and abroad. At the initial gathering, Secretary Wilson stated that on the basis of the agreement to be reached, the government will lay down a national labor policy to continue in force until the war ends and will, if necessary, seek legislation to enforce it. He believed, however, that once an agreement is reached, both capital and labor will arrange to keep its provisions, although it is realized that no agreement would entirely prevent labor dissatisfaction and strikes.

Many Disputes Before Conference

Fifty-nine separate disputes which are at present upon the labor department's conciliation list, confront the conference. These include the following: Empire Steel & Iron Co., Catasauqua, Pa.; Canton Stamping & Enameling Co., Canton, O.; Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.; Remington Arms Corp., Bridgeport, Conn.; Continental Can Co., Syracuse, N. Y.; Kerr Turbine Co., Wellsville, N. Y.; Curtis Aeroplane Co., Buffalo; General Electric Co., Schenectady, N. Y.; and the B. F. Sturtevant Co., Boston.

At the suggestion of Secretary Wilson, whom President Wilson directed to formulate a labor program for the war, the national industrial conference board named five representatives of employers to attend the conference as follows: Loyall Osborne, New York, vice president of the Westinghouse Electric & Mfg. Co.; Charles F. Brooker, Ansonia, Conn., president of the American Brass Co.; W. H. Van Dervoort, East Moline, Ill., president of Root & Van Dervoort Engineering Co.; L. F. Loree, New York, president of the Delaware & Hudson Railroad Co., and C. Edwin Michael, Roanoke, Va., president of the Virginia Bridge & Iron Co. The representatives selected by the American Federation of Labor include: Frank J. Hayes, Indianapolis, president of the United Mine Workers; William L. Hutcheson, Indianapolis, president of the Brotherhood of Carpenters and Joiners; J. A. Franklin, Kansas City, president of the Brotherhood of Boiler Makers; Victor Olander, Chicago, representative of the Seamen's Union, and T. A. Rickert, Chicago, president of the United Garment Workers. Two representatives of the public will be named to make up the twelve members of the conference.

One problem expected to be hard to solve is that of the open or closed shop. Some officials believe it may be necessary to establish standard wages in districts to prevent the various industries engaged in war work from bidding against each other.

The conferees represent some 70,000 manufacturing plants working on government contracts and more than 2,000,000 union workers. Nonunion labor has no representation and neither have the railroad brotherhoods. Any arrangement reached will apply to unorganized labor but not to the railroad employes, whose claims are to be dealt with separately.

High-Paid English Workers Spending Lavishly

One by-product of the war in England which is finding its counterpart in many sections of the United States is the liberal spending for luxuries induced by high wages. This is particularly true in the steel centers, and shopkeepers of Sheffield are experiencing better business than has obtained for several years. The latter always have claimed that the most profitable and satisfactory class of business is with the working people, when employment is regular. Then money is spent with a prodigal hand by the workman and his family, all transactions are on a cash basis, and no haggling over price. While professional people, during the past year, have been compelled to observe the most rigid economy, the wage earners have been able to buy the best and most expensive of everything. Never before have tradesmen sold so many sealskin coats, furs, silk waists, etc., and most of this business has been with women with shawls over their heads, according to the *Sheffield Telegraph*. So common have furs costing 20, 30 and 40 pounds become among women mutioneers that well-to-do-ladies do not care to buy and wear them. A sealskin coat was purchased not long ago in Sheffield at a price of £120, and it was delivered at a house in the poor district where the rent would not exceed 7 shillings a week. Manchester, London and Bradford warehousemen report that their turnover in Sheffield has been phenomenal.

That this is not confined to wearing apparel is evidenced by like reports from butchers and provision dealers, who are disposing of their choicest products to the working classes. Vast sums are being spent on pianos, jewelry and high-grade furniture.

Labor Notes

Applications are being received by the navy department from women who are able to qualify as ship draftsmen. Salaries range from $4 to $6.88 a day.

Women are being employed in some parts of the Pennsylvania anthracite fields for weighing, since male labor has become so scarce.

On the Pacific coast the United States shipping board is giving a 10 per cent increase in the wages of night workmen in shipyards, in an effort to expedite production.

For the shipyard workers employed by the New York Shipbuilding Co., Camden, N. J., 250 houses are being built. This is the first operation in the scheme to house the nation's shipbuilders.

An appropriation of $500,000 has been asked by Secretary of Labor Wilson in order that funds for transportation expense may be advanced to labor bound to farms and shipyards. This is in harmony with the Australian system.

To train women for farm work, the government has under consideration a plan to establish a camp, to which they may be sent when recruited, since a period of instruction is necessary for those who have had no previous farming experience.

Fifty-seven stars were recently added to the 9 x 16-foot service flag unfurled recently by the Norton Co., Worcester, Mass., making the total 397. In the lobby of the company's administration building, a cabinet has been placed containing the names of each man in service, followed by the branch of service to which he has been assigned.

Iron and Steel Financial News

Up-to-the-Minute Fact and Comment Collected and Sifted For Busy Readers

Reserve Board to Probe Capital Issues

WASHINGTON, Feb. 26.—The revised bill creating a war finance corporation, to be taken up by the senate, would control all security issues larger than $100,000 and place that control in the hands of the capital issues committee of the federal reserve board. This committee, already acting on issues larger than $250,000 without authority of law but with support of all federal reserve member banks, has reduced this sum to $100,000 and will continue approving or disapproving such new financing.

This decision of the committee was announced last week with the explanation that the majority of new issues, especially many of those it feels are unnecessary, are of amounts smaller than $250,000. The impression prevails that the committee acts only upon state, municipal or county issues, but this is erroneous because the plan fully covers any new financing undertaken by any public utility or industrial corporation the extent of whose new issue of security would top $100,000.

Complete Information Wanted

The committee points out no particular application form is required but it does want complete information as to the proposed issue of bonds, notes, shares, etc. The committee wants to know if the purpose of the new issue "is to refund, fund, pay or extend outstanding bond, obligations or indebtedness," the nature and character of the bonds, etc., to be refunded and the time or times and the general purpose for which unsecured indebtedness was incurred. It also desires to know if the issue is for war purposes or to raise capital in connection with war contracts or war supplies or to provide equipment, buildings or facilities for war work.

If war purposes are involved, the committee asks that reference be made to the proper governmental authorities at Washington and elsewhere to enable definite information and corroboration to be obtained directly by the committee. A clear exposition must be given if the issue is for private financial requirements and no public interests are involved and the issues must be fully described if believed necessary for public health, welfare, or necessity or are for the account of any governmental requirement, whether national, state, municipal or county.

In all explanations and applications, the committee requires a statement why the proposed issues cannot be postponed until after the war, or why the necessity is greater than the national needs in conserving financial resources, materials and labor.

Data to be Furnished

The committee asks the following information be given as fully as possible for any governmental issues:

"Names, amount, date, and dates of maturity and serial numbers of proposed bonds, notes or other securities.

"Amount of total authorized issue of which proposed issue is part.

"Attested copies of votes, ordinances or resolutions authorizing proposed issue.

"Attested copy of mortgage, deed of trust, or similar instrument under which proposed issue is made or by which it is secured.

"Last balance sheet of corporation and copy or charter and by-laws, if in print."

If the issue is of shares of stock, the committee asks:

"Total capitalization of company.

"Last balance sheet and copy of charters and by laws if in print.

"Total authorized issue of stock of which proposed issue is part.

"Amount of proposed issue, method and dates of issue, whether by offer to shareholders or sale or public subscription.

"Attested copies of votes authorizing proposed issue."

The capital issues committee, its advisory board and representatives of public utility commissions will meet here Thursday mainly to see if the commissions cannot urge postponement of construction and development work whether contracted for or stipulated in franchises, when the work does not directly contribute to winning the war.

Steps were taken last week to curtail roadbuilding unless they are actually war highways. More than $300,000,000 is spent in road construction annually and this sum is urged reduced as far as practicable. F. H. Goff, member of the capital issues advisory committee; L. W. Page, representing the federal bureau of public roads, and the following state road commissioners attended a conference at which this subject was discussed: G. P. Coleman, Virginia; A. D. Williams, West Virginia; Henry G. Shirley, Maryland; Thomas H. McDonald, Iowa; Thomas H. French, New Mexico; and Paul D. Sargent, Maine.

Steel Shortage Big Factor in Cutting Profits

How the shortage of steel which has prevailed universally during the past year has affected the railroads, equipment companies and business in general, is briefly but graphically outlined by President F. N. Hoffstot, of the Pressed Steel Car Co., in his annual report to stockholders. The company did a larger gross business in 1917 than in 1916, amounting to $44,034,000, as against $31,202,000 but net income was only $2,130,000 against $2,751,000 the year before. After all deductions the balance available for the common stock was only slightly over $10 a share, compared with $15 a share in 1916. This showing was due directly to the inability to get raw material and labor.

Delayed Supplies Cut Profits

President Hoffstot points out these facts in his statement to stockholders. He says: "It is a disappointment to your management that the percentage of profit has not been greater, but it is largely due to the two contingencies referred to in last year's report—the

inability to secure regular supplies of raw materials and labor.

"In the manufacture of steel cars it is necessary that component factors reach plants in proper proportion and regular order. For example, the average car requires for its construction approximately 50 per cent plate steel and 50 per cent steel in the form of shapes and bars. Until the middle of October there was received less than one-half the plate steel requirements, with the result that inventories were unduly increased to more than treble in value and double in units on account of large quantities of shapes and bars coming in regularly without plates, thus causing additional expense. In order to increase production, fill orders as nearly as possible on time, and minimize loss, there was purchased outside of existing contracts a large quantity of plate steel at a high average price.

"The establishing, however, of fixed prices prevented utilizing the steel due from the original source of supply at the time deliveries could be secured on basis of the delay in the receipt of complete material postponed the construction of some work over a period in which there were several increases of wages of day workers, and in this period shop supplies including fuel increased in the same ratio. This was serious, because a large percentage of the business was taken prior to Dec. 1, 1916.

Equipment and Terminals Needed

"It is our firm belief that if adequate provision had been made for equipment and terminal facilities in the past to keep pace with the country's increase in tonnage there would not have been this desperate freight congestion, nor would the cost of materials and labor have advanced so rapidly. For example, the tonnage capacity for steel ingots has increased from 30,000,000 tons in 1912 to 50,000,000 in 1917, and as far as we are able to definitely ascertain, there were less cars available in 1917 than six years ago. The increase in this kind of tonnage causes serious demands in the way of cars and locomotives by reason of the fact that six or seven tons of limestone, coke, pig iron and other materials are required to be hauled in the production of one ton of steel ingots.

"A matter of the gravest importance in the present crisis which it is hoped our government may promptly correct is the migratory disposition of workingmen, as to win the war it will require steady, sober application by every one. Labor conditions have been most difficult, and we can no better illustrate this than by the statement that during the year we employed four men for every job, that is, each employe averaged only three months' service with us. This changing of employment slows down production and tends to make high costs."

Breaks Quarter's Record

Steadily rising net earnings gave the Colorado Fuel & Iron Co., Denver, the record-breaking total of $2,334,763 for the final quarter of 1917. In the corresponding periods of 1916 and 1915, they aggregated $1,886,359 and $896,351 respectively.

Gross receipts of $10,297,600 in the last quarter of 1917, showed a gain of $1,139,792 over the corresponding quarter in 1916. The operating costs were $8,203,638 which was approximately $1,000,000 greater. Interest and taxes also increased, bringing the surplus down to $1,540,816, a total of $227,200 larger than the year before.

Allis-Chalmers Gains Much

That sales have been more than doubled and net profits have nearly increased four-fold since 1915 for the Allis-Chalmers Mfg. Co., Milwaukee, is shown by the annual report recently issued. Net profits for 1917 were $4,010,489 as compared with $3,165,020 the year previous and with $1,078,352 in 1915. A new sales record was made with an aggregate of $26,129,314, against $19,440,500 in 1916, and $11,666,413 in 1915. Orders on hand Dec. 31, 1917, aggregated $26,935,146 as compared with $13,424,486, Dec. 31, 1916. For the final quarter of the three years 1917, 1916 and 1915, the net profits were $1,187,957, $928,722 and $559,445 respectively. Sales for those periods aggregated $8,216,959, $5,741,678 and $3,770,148, respectively.

Bethlehem Steel Again is Winner in Court

A signal victory was added to the Bethlehem Steel Corp.'s legal triumphs over the General Investment Co., New York, when Federal Judge Rellstab, Trenton, N. J., denied the petition of the investment company that the corporation be prevented from guaranteeing the bonds of its subsidiary companies and from mortgaging property to secure such bonds. The particular case was that of the Eastern Coke Co., formed by the corporation when it purchased the Lehigh Coke Co., early in 1917 from the Pittsburgh By-Products Co., for $8,000,000, of which $7,000,000 was represented by the Bethlehem company's promissory note.

The court was asked to declare invalid the Steel corporation's guarantee of the Eastern Coke Co.'s bonds, which were purchased by the defendants in the case, the Mellon National bank and the Union Trust Co., of Pittsburgh. This the court declined to do on the ground that the liability incurred by the corporation in guaranteeing the bonds of subsidiary companies was not a risking of the former's capital in another's enterprise, but in aid of its own, and over which, through its subsidiary companies it had complete control.

The method of financing the purchase by the Bethlehem company of the Lehigh Coke property was to exchange for the promissory note 14-year 5 per cent bonds, of a like sum, which were issued by the new coke company organized to acquire the Lehigh possessions. This offer was accepted by banks with the provision that the bonds would be guaranteed by both the Bethlehem company and its parent, the Corporation.

Great Strides Made

Over five times the amount of net profits for 1915 was made by the National Enameling & Stamping Co., St. Louis, in 1917. The total last year was $5,618,548, compared with $2,731,183 for 1916 as against $1,066,242 for 1915. Total income for the three years was $6,460,780, $3,679,762 and $1,936,620 respectively, as shown by the following comparative statement:

	1917	1916	1915
Total income..	6,460,780	3,679,762	1,936,620
Net profits....	5,618,548	2,731,183	1,066,242
Bal. af. chgs..	4,245,555	2,417,803	913,742
Pfd. divs.	598,262	598,262	598,262
Surplus	3,647,293	1,819,541	315,480
Prev. surplus..	2,895,407	1,575,867	1,260,388
Total surplus..	6,542,700	3,395,408	1,575,868
Com. divs. ...	623,672	.....	.....
Gen. reserve...	.....	500,000	.....
P. & L. surp..	5,919,028	2,895,408	1,575,868

Continental's Gain Large

After all deductions, including $850,000 reserved for income and excess profits taxes, were made, the net earnings of the Continental Can Co., Syracuse, N. Y., were $3,280,977 for 1917, as compared with $2,143,554 for 1916, an increase of $1,137,423. The surplus available for the common stock of $10,000,000, after dividends on preferred, was equal to $29.36 a share as compared with $22.37 a share on $8,000,000 common stock the previous year. A comparative statement follows:

		For year ended	
Dec. 31:	1917	1916	1915
Net earnings...	4,531,369	2,510,665	1,457,965
Depreciation ..	400,392	323,111	132,127
Taxes	850,000	44,000	.....
Balance	3,280,977	2,143,554	1,325,838
Pfd. divs.	344,575	353,237	361,725
Com. divs. ...	450,000	400,000	200,000
Pfd. stk. red..	165,000	165,000	80,500
Surplus	2,321,402	1,225,317	683,613

New Army Projects Get Under Way

Two Ordnance Base Depots Are Among Latest Authorizations Given to Army—Government Prepares to Distribute Ordnance Contracts Aggregating $200,000,000—Sparrows Point Plant to be Enlarged

AUTHORIZATION for new army construction work totaling tens of millions of dollars has has been given to Gen. I. W. Littell, in charge of the department of construction. Included in the authorizations are two ordnance base depots to be built on the Atlantic coast at a cost of $4,000,000 and $6,000,000; various aviation projects which will entail the expenditure of $46,000,000, and a gasmaking plant which will be built at Edgewood, N. J., at a cost of $37,000,000. Equipment needs of these new projects, it is anticipated, will be felt in the crane and machinery markets. No definite announcement has been made as to when work will commence on these new projects. Negotiations are also being carried out by the government preceding the letting of contracts for field pieces and ordnance which will involve an outlay of approximately $200,000,000. The government is having difficulty in distributing contracts for machining shell forgings, owing to the inadequate capacity of the country for this type of work. The forging facilities of the nation, however, are more than sufficient for the present need. Arsenals and navy yards are insistent in their demands for machine tools and cranes.

Inquiries, except in rare instances, are not of great size. One list in which several hundred tools are itemized, is current in the New York market. Shipments and plant production are showing marked improvement. Used tools are being utilized to an unprecedented extent. Several old plants have been dismantled and the equipment transferred. One Chicago company which has been unable to secure lathes needed to complete its contract for recoil mechanisms has made plans to build these tools.

Lull in Tool Markets Becomes More General

MACHINE tool sellers report that both shipments and plant operating rates have improved greatly in the past few weeks. A number of plants now are operating at capacity. The crest of the government demand seems to have temporarily passed. Many of the big preliminary projects arising from our war preparations are well under way by this time. In many cases where it appeared that inability to get equipment would hold up progress indefinitely expedients have been resorted to which have assisted materially. An immense number of used tools has been pressed into government service. Entire plants have been bought and their equipment transferred to government contractors. Thus the Duesenberg Motors Corp., 120 Broadway, New York, which has been constructing a plant at Elizabeth, N. J., for building airplane and marine engines for the government, has been transferring the machinery of the Fiat Motor Co., Poughkeepsie, N. Y., whose plant it bought a month ago, to Elizabeth. The Federal Shipbuilding Co., 54 Dey street, New York, not long ago was reported to have bought about $100,000 worth of machines from a Long Island plant built by the late J. K. Stewart, for its shipyard in Newark Bay.

Boring Mills are in Great Demand

While several manufacturers of machine tools report a tendency toward better delivery dates on many types and sizes of tools, on some machines the time steadily is becoming extended. These include planers, on which makers now are promising deliveries of six to 12 months, according to size; 4, 5 and 6-foot radial drills, four to six months; and boring mills, on which the time averages about 12 months. Among the companies which have been trying to get such machines is the Submarine Boat Corp., which is inquiring for three 72-inch planers. The Brooklyn navy yard is inquiring for a number of tools. The Watertown arsenal, Watertown, Mass., again is in the market. The list of machines recently issued by the Aeronautical Engine Co., Long Island City, N. Y., was additional to the original long list issued several months ago and all these requirements are being held up pending action by the government. The Savage Arms Co., Utica, N. Y., is buying actively against the large list of tools it recently issued in preparation of expansion of its plant to approximately twice its present size.

Sparrows Point Plant to be Enlarged

Charles M. Schwab's statement last week, while on a visit of inspection at the Sparrows Point, Md., plant of the Bethlehem Steel Corp., that the company would spend another $25,000,000 in the near future for improving the plant, was received with much interest in the machine tool and crane trades. Last spring the company expended $25,000,000 for improvements and its purchases both of cranes and tools amounted to several millions. The Worthington Pump & Machinery Corp., which accepted a contract several months ago to manufacture pumps for submarine destroyers, is in the market for several hundred tools for the Deane Pump Works, Holyoke, Mass. The government still is distributing orders for shell forgings, but is experiencing difficulty in placing finishing contracts. It is estimated that negotiations are in progress for the placing of orders amounting to about $200,000,000 for field pieces and ordnance.

Government Buys Cranes for Explosive Plant

The lull in crane buying now is more marked than for some time. Few new inquiries are coming out and little business is being placed. Included in business still pending is that of the General Electric Co., Lynn., Mass., involving four electric traveling cranes, ranging from 5 to 20 tons in capacity. The inquiry of the Du Pont Powder Co., Wilmington, Del., for eight locomo-

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"AGATHON"
Chrome Vanadium
"AGATHON"
Nickel Steels
"AGATHON"
Special Analyses
"AGATHON"
Vanadium
"AGATHON"
Chrome Steel
"AGATHON"
High Carbon
AGATHON
ALLOY STEELS
No matter what you use them for,—if you use alloy steels, you should use Agathon Alloys.
The presence of Agathon steels in a product is assurance of continuous unimpaired service and absolute customer satisfaction insofar as the steel parts are concerned.
We can make Agathon Alloys to any desired analysis but to one standard only—that which has lifted Agathon Steels to the pinnacle of quality.
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Cleveland Office—Hickox Bldg., The Hamill-Hickox Co., Dist. Representatives.
Chicago Office—1370 People's Gas Bldg., 122 So. Michigan Blvd., C. H. Beach, District Sales Manager.
Philadelphia Office—603 Widener Bldg., Frank Wallace, District Sales Manager.
Syracuse Office—521 University Block, T. B. Davies, Dist. Sales Manager.
E. Dockendorff & Co., 20 Broad St., New York, Gen. Export Agents.
AGATHON STEELS

tive cranes also remains before the market. It is understood that the Worthington Pump & Machinery Corp., which recently was inquiring for a 10-ton electric crane for its plant at Holyoke, Mass., is asking for specifications on several additional electric cranes for that plant. Perhaps the most interesting piece of business placed of late is that involving forty-nine 2-ton, hand power traveling cranes and twenty-one 2-ton chain hoists for the government's explosive plant No. 3 at Charleston, W. Va. This conveying equipment was awarded to J. N. McKinney, contractor, of Chicago. The Groton Iron Works, which recently was inquiring for four 5-ton electric cranes, with 80-foot span, has placed two of these cranes. It is believed that action on the remaining two cranes has been indefinitely postponed.

Cleveland Company Receives Large Tractor Order

AN order for tractors which it is estimated will involve the expenditure of $10,000,000 is reported to have been awarded to the Chandler Motor Car Co., Cleveland. According to latest reports the Chandler company will assemble these tractors—a plan which it has heretofore followed in the motor car field—and sublet contracts to parts makers. The effect of this contract, it is thought, will be felt in the local market in a greatly augmented demand for machine tools from parts makers. Preparatory to the production of tractors on a large scale, the Cleveland Tractor Co., Cleveland, has started construction work on the first quarter of its new plant. New tools have been bought from time to time, but the equipment requirements of the new plant will result in considerable new buying, it is said. Production work will be started by the Stearns Motor Car Co., Cleveland, about April 1 on its contract for 1500 Rolls-Royce aviation motors. According to the stipulations of the contract, these motors are to be completed by Sept. 1. Several lots of tools have been purchased by the Stearns company during the past few months. The latest inquiry emanating from this source is for turret lathes. A government contract has been awarded to the Ohio Shipbuilding Co., Cleveland, and the company has commenced construction work on a new plant. Part of the equipment needed has been purchased.

Dealers report business to be of good volume. One dealer states that his business during the month of January was better than that of any month during last year. Tools are moving freely from stock; dealers who are fortunate enough to have tools in stock are experiencing little difficulty in disposing of them. A disposition on the part of manufacturers who are engaged on government work to be slow in closing for tools has been observed by several dealers. This is attributed in great part to their difficulty in securing compensation for work already completed on these contracts.

Chicago Market Displays Continued Dullness

QUIET conditions continue in the Chicago market, inquiries and buying being of little importance compared with business done during most of last year. Miscellaneous lots and single tools make up most of the business now being booked, but there are some important projects on the way that may develop larger buying. Filling-in to round out equipment is being done by buyers who have covered their main needs, and small shops are taking a few tools. Even second hand tools are scarce as most owners have sufficient work to keep their machines busy and are not seeking to sell, even at the profitable prices that can be obtained. The Otis Elevator Co., Chicago, which has taken a contract for recoil mechanisms, has placed an order for some equipment and will manufacture its own lathes for turning cylinders. The Standard Steel Car Co., which is building a large shop at Hammond, Ind., to handle government work, has filled most of its requirements. The Northern Boiler & Structural Works, Appleton, Wis., will build an addition. The Universal Lock Nut Co., Portland, Oreg., will build a plant. The Warman Steel Castings Co., Los Angeles, Cal., will build a 100-foot extension to its plant at Huntington Park. The Premier Machinery Co., Oakland, Cal., will build an additional plant.

Pittsburgh Market Shows Improvement

SHIPMENTS of machinery and machine tools have become somewhat easier since the improvement in the railroad situation and sellers in the Pittsburgh district report that inquiries are slightly more numerous. The commercial market, however, is far from being brisk, due to high prices and deferred shipments. The government continues to place large orders and of course is given preference by manufacturers. The Cleveland Crane & Engineering Co., Cleveland, has sold three 10-ton cranes for the Hoboken, Pa., plant of the Blaw-Knox Co.

New Construction and Equipment

Concise and Timely Business Building Opportunities from the Field of Industry

Among New England Factories

AUBURN, ME.—The Mount Apatite Mining Co. has been incorporated to do mining, milling and smelting with $10,000 capital. Frank H. C. Reynolds, Walter I. Stevens and A. S. Greenlaw are interested.

PARIS, ME.—The Paris Machine Co. has been incorporated with $10,000 capital by Horace E. Edwards and A. Frank Goldsmith.

ATTLEBORO, MASS.—New plans are being drawn for a brick, mill-construction, 1-story, 100 x 160-foot addition to the pattern storage department of the Howard & Bullough American Machine Co. Cost will be about $50,000.

BEVERLY, MASS.—The M. D. Nichols Tool Co. Inc. has been incorporated with $25,000 capital by Myron D. Nichols, C. A. Olsen and A. E. Nichols.

BOSTON.—The Coe-Stapley Mfg. Corp. has been incorporated to engage in a general manufacturing business with $700,000 capital by H. B. Faxon, Brookline, Mass.; Robert H. Spare, Reading, Mass.; and F. R. Switzer, Brookline, Mass.

NATICK, MASS.—The Natick Building association will build a brick, 2-story, 67 x 86-foot factory addition to cost $25,000 for the New England Pressed Steel Co.

NEW BEDFORD, MASS. — The Union Street Railway Co. has let the contract to the J. W. Bishop Co. for a brick and steel, 2-story, 98.9 x 126-foot boilerhouse and turbine room to cost $150,000. The Harry M.

QUICK ACTION with ROLLING MILL JIM

Say fellows! If you want quick deliveries on steel castings send them to "Hubbard". They sure can get the stuff out quick and know how to make it too.

So long,

Rolling Mill Jim.

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

All Kinds of Iron and Steel Rolls and Steel Castings.

Hope Engineering Co., Boston, is the engineer.

NEW BEDFORD, MASS.—The Continental Wood Screw Co. will erect an addition to its plant on Mt. Pleasant street. C. Hammond & Son, architects, are drawing plans.

SPRINGFIELD, MASS.—The Kero-Karburetor Co. has been incorporated to make carburetors with $100,000 capital by M. H. Alexander, Harold W. Alexander and John T. Clancey.

SPRINGFIELD, MASS. — Frederick T. Kellogg has awarded the general contract for a $15,000 plant addition to the Barrett-Curtis Construction Co.

WEST SPRINGFIELD, MASS.—The Boston & Albany R. R. Co. is building a brick, 1-story, 51 x 22-foot oxyacetylene generating house to cost $30,000. It will be equipped with a special roof which will blow up in case an explosion occurs, and the force of the discharge will be wasted.

WORCESTER, MASS.—The Crompton & Knowles loom works has let the contract for a brick addition to its foundry on Gardner street to be used for a cinder mill.

WORCESTER, MASS.—Contract for erecting a $20,000 1-story addition to the machine shop of the Crompton & Knowles Loom Works has been awarded recently.

BRIDGEPORT, CONN.—The General Machine & Mfg. Co. has been incorporated with $50,000 capital by A. H. Nilson, Mauritz Olson, John M. S. Anderson and David Hjorth.

BRIDGEPORT, CONN.—The Bridgeport Compressed Paper Box Co. will build a brick, mill construction, 2-story, 40 x 130-foot addition to cost $25,000 at its plant, 128 Thompson street.

BRIDGEPORT, CONN.—The Raybestos Co. has increased its capital from $1,750,000 to $2,000,000, to provide for extensions.

BRIDGEPORT, CONN.—The Pharo Mfg. Co. has been incorporated with $70,000 capital by R. D. Chapman, Gordon C. Pharo and W. R. Bassick, and will build a factory at Detroit.

MIDDLETOWN, CONN. — The Buckner Process Co., Worcester, Mass., manufacturer of leather belting, chemicals, etc., has let the contract for a branch factory to be built at Middletown.

NEW HAVEN, CONN.—The New York, New Haven & Hartford railroad has started work on the construction of a 1-story addition to its round house. The structure will be 97 x 238 x 486 feet in size.

NEW HAVEN, CONN.—The Sperry Engineering Co. has been awarded the contract for erecting a $30,000 plant, 1-story high, 51 x 51 feet in size, for the International Leather & Belt Co., 501 Fifth avenue, New York.

NEW HAVEN, CONN.—The William Hale Welding Co. has been incorporated with $50,000 capital by William Hale, Harry Hale and Sherman I. Graves.

Along the Middle Atlantic Seaboard

AMSTERDAM, N. Y.—The N. L. Merwin Co. has awarded to L. J. Callahan the contract for a $9000, 3-story plant addition.

BUFFALO.—Plans are being drawn for a $25,000 addition to the plant of the Linde Air Products Co., Broadway and the New York Central railroad.

COLLEGE POINT, L. I., N. Y.—The American Hard Rubber Co., 11 Mercer street, New York, has awarded the general contract for a $5000 addition to its College Point plant, to Marc Eidlitz & Son, 30 East Forty-second street, New York.

HUDSON, N. Y. — The general contract for a 1-story, 70 x 191-foot plant addition has been awarded to the Torrington Building Co., Torrington, Conn., by the Stewart-David Equipment Corp., of which Robert B. Stewart, 17 Battery place, New York, is president.

MT. VERNON, N. Y.—A charter has been granted to the Mt. Vernon Diecasting Corp., capitalized at $100,000, to manufacture hardware supplies. N. A. LeSavoy, 911 East 178 street, New York, is interested.

NEW YORK.—The Bordentown Steel & Tube Corp. has been incorporated with a capital of $250,000 to manufacture steel and iron tubing. The incorporators are L. H. Sanders, S. M. Lazarus, W. P. Riley, 2 Rector street, and others.

NEW YORK.—The Alloys Mfg. Corp. has been chartered with $250,000 capital to manufacture die castings and drop forgings. The incorporators include C. W. Lucas, H. C. Wing and M. M. Grunthal, 27 Cedar street.

NEW YORK.—The William F. Davis Machine Tool Co. Inc. has been chartered to manufacture machine tools with $200,000 capital. The incorporators include W. P. Davis and B. B. Ketcham, 85 Liberty street, and W. Allen, 149 Broadway.

NEW YORK.—The Rustproof Metal Seal Corp. has been granted a charter of incorporation. The company is capitalized at $100,000 and will manufacture metal seals, stoppers and crowns. Incorporators include D. Wallace, 772 St. Nicholas avenue, I. M. Katz and others.

OSWEGO, N. Y.—The Ames Iron Works plans to build a $25,000 addition to its foundry. Thomas Coon, Syracuse, N. Y., is in charge of the work.

ROCHESTER, N. Y.—The contract for a $50,000 plant addition has been awarded by the Wollensek Optical Co. to the A. Frederick & Sons Co. The proposed structure will be three stories high and 102 x 172 feet in size.

WESTFIELD, N. Y.—The village is having plans drawn for the rebuilding of its boiler works. Alterations under consideration will cost approximately $30,000. C. C. Hill, Northeast, Pa., is chief engineer.

YONKERS, N. Y.—The Continental Shipbuilding Co. will erect a 2-story, 50 x 1000-foot plant in this city. Thomas Bird, 30 East Forty-second street, New York, is engineer in charge of construction.

ALLENTOWN, PA.—L. S. Jacoby, architect, will take bids about March 1 for a machine shop. The name of the owner is being withheld.

BERWYN, PA. — The American Bronze Co. is receiving bids on the construction of a 1-story brick and steel foundry, 80 x 100 feet.

HURON, PA.—The Buckeye Coal Co. plans to develop mining property at a cost of approximately $2,000,000. This work will include not only extensive underground development but also the erection of a steel tipple and other structures.

MARCUS HOOK, PA.—Bids will be received soon by F. W. Van Loon, 4 South Eleventh street, Philadelphia, for an addition to the plant of the Benzol Products Co.

MODENA, PA.—Preliminary plans are being drawn by L. Z. Slawter, Coatesville, Pa., for a $15,000, 3-story plant for the Gerson Paper Stock Mill Co.

MORRISVILLE, PA.—The government will erect a large munitions plant on the Delaware river, between Morrisville and Tullytown, Pa. E. C. Hill & Co., 11 West State street, Trenton, N. J., are in charge of construction.

PHILADELPHIA.—A charter has been granted by the state of New Jersey to the Florence Pipe Foundry & Machine Co., capitalized at $1,000,000 and incorporated by Charles R. Wood, Spencer P. Hazard and Edwin J. Lane.

PHILADELPHIA.—The Nitrogenous Chemical Co. plans the construction of a plant at Thirty-seventh street and Tasker avenue. J. Louis Luckenbach, 119 South Fourth street, is engineer.

PITTSBURGH.—A charter was granted to Keating & Block, electricity, capital $5000. The incorporators are William A. Keating, Pittsburgh; Douglas C. Block, Dormont; R. G. Bostwick, Wilkinsburg.

PITTSBURGH.—A charter was granted to the Electrical Engineering Co., capital $30,000. The incorporators are Thomas C. Hodgdon, J. E. Mair, C. R. Hodgdon, Pittsburgh.

PITTSBURGH.—A charter was granted to the Bradford Gas Coal Co., capital $50,000. The incorporators are M. G. Voelker, Charles A. Royce, Buffalo; Robert L. James, Pittsburgh.

PITTSBURGH.—An application was granted to the Penn-Pitt Coal & Coke Co. for permission to construct a river tipple loading platform and two ice breakers on the north

Government Inquiries

Bids on the following equipment are desired by the navy department, bureau of supplies and accounts, Washington:

Two wire feed screw machines, 1721, no date, Washington.

Four grinding machines, 1721, no date, Washington.

One motor-driven thread milling machine, 1721, no date, Washington.

Four motor-driven die-sinking machines, 1721, no date, Washington.

One motor-driven power punch, 3323½, March 1, Brooklyn.

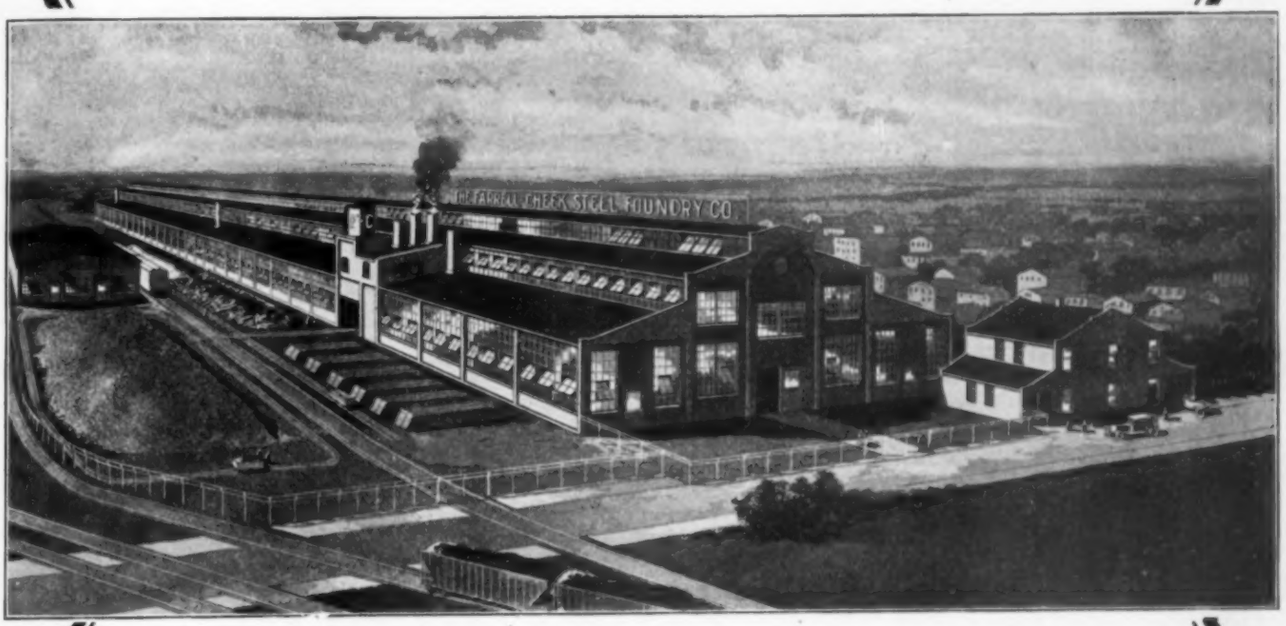
One milling machine, 3323½, March 1, Brooklyn.

One steam hammer, 3323½, March 1, Brooklyn.

One steam drop hammer, 3340½, March 8, Norfolk.

Schedule numbers, dates of opening and places of delivery follow the specifications of the tools.

Farrell-Cheek
CASTINGS
for
Tractors, Trucks, Machine-tools



The terrific, pounding, racking strain under which motor propelled vehicles must operate, necessitates the use of castings of high resilient qualities in their construction.

Farrell-Cheek Castings are particularly adapted to this purpose because they are made after an analysis formulated especially for light castings of high resilience.

We also manufacture *Blank Gears;* Carbonizing Boxes; and Case Hardening Boxes.

Let us know your requirements.

Farrell-Cheek Steel Foundry Co.

SANDUSKY, OHIO

BRANCH OFFICES

NEW YORK PHILADELPHIA CHICAGO

Say you saw it in THE IRON TRADE REVIEW

bank of the Monongahela river, about three miles above lock No. 7, 85.3 miles above the mouth of the river, in Greene county.

TEMPLE, PA.—The Seaboard Steel & Manganese Co. is erecting an 11 x 18 x 80-foot skip-filled blast furnace. It has installed an additional stove, 20 x 70 feet and a new blowing engine.

UNIONTOWN, PA.—A charter was granted to the Uniontown Foundry Co., capital $10,000. The incorporators are E. R. Floto, Connellsville, Pa.; W. J. Doorley, Scottdale, Pa.; D. C. Evans, Uniontown.

WILLIAMSPORT, PA.—Bids are to be received in April for 3-span, 220-foot reinforced concrete bridge over Lycoming creek by the Lycoming Co. to cost about $50,000. The city is to bear part of the cost.

CAMDEN, N. J.—Titan Automatic Tool Co. has been chartered with a capital stock of $1,500,000 to manufacture tools, etc. Joseph P. Murray, Frank S. Muzzey and F. Stanley Saurman, all of Philadelphia, are the stockholders.

CAMDEN, N. J.—The Caloric Furnace Co. has been incorporated with $100,000 capital to manufacture furnaces. E. R. Lippincott and G. C. Chase, Collingswood, N. J., and J. H. Carr, Camden, are incorporators.

DELAWANNA, N. J.—Russell G. Cory, 39 Cortlandt street, New York, will receive bids shortly on the erection of a $250,000 addition to the plant of Worthen & Aldridge.

ELIZABETH, N. J.—The Duesenberg Motors Corp. will erect a plant addition, one and two stories high, 140 x 440 feet in size.

ELIZABETH, N. J.—Union Tire & Supply Co. has been chartered with $75,000 capital to manufacture automobiles, etc. The incorporators are A. G. Weinberg, Henry Weinberg, of Harrison; Joseph Berkenheimer, Newburgh, N. Y.

HANOVER FARMS, N. J.—The Atlantic Loading Co., 71 Broadway, New York, will erect a 1-story ammunition plant here.

HIGHTSTOWN, N. J.—The Borough council contemplates building a filtration plant to cost $19,000.

HOBOKEN, N. J.—Plans are being revised by the Union Iron Works for its proposed $12,000 fabricating shop. Max Beyer is the architect in charge of this work.

JERSEY CITY, N. J.—Mutual Iron works has been chartered with $125,000 capital to operate machine and other kinds of shops. The incorporators are: James McIlvrid Sr., E. V. Cotter, and James McIlvrid, all of Jersey City.

NEWARK, N. J.—The contract for a $6000 foundry addition, one story high and 46 x 69 feet in size has been awarded by Louis Sachs to Andrew Eitel.

NEWARK, N. J.—The Newark Engineering & Refrigerating Co. will start work soon on an addition to its machine shop, to cost $4500.

NEWARK, N. J.—The Hay Foundry & Iron Works, Plum Point Lane, will erect a 1-story brick and steel shop building, 86 x 165 feet, to cost $30,000.

NEWARK, N. J.—City commission contemplates erecting municipal ice plant at cost of $30,000. Address Mayor Gillen.

NEW BRUNSWICK, N. J.—The board of commissioners will receive bids on March 5 for the installation of a 275-horsepower water tube boiler. Asher Atkinson is city engineer.

RIDGEFIELD PARK, N. J.—The British-American Chemical Co., L. G. McNab, 52 Vanderbilt avenue, New York, secretary, contemplates the erection of several plant additions.

TRENTON, N. J.—The Structural Concrete Co. has been chartered with $75,000 capital to engage in structural concrete contracting. Kepple Hall, William Stroop and Charles Wuicht, Dayton, O., are incorporators.

TRENTON, N. J.—City Commission will erect a new municipal tuberculosis hospital at cost of $100,000. Klemann & Fowler, First National Bank building, are the architects.

BALTIMORE.—The Kelly Springfield Tire Co., Akron, O., will erect a plant in this city to cost about $1,000,000. The main structure of the proposed works will be three stories high. Edward Mercer Ulmer, architect, 507 Fifth avenue, New York, is drawing plans.

BALTIMORE.—The H. E. Crook Shipbuilding Co. has awarded to the McLain Construction Co. the general contract for erecting a $25,000 warehouse, one story high, and 160 x 500 feet.

Activities in the Central States

APPLETON, WIS.—The Reliance Motor Truck Co., Appleton, Wis., formerly of Racine, Wis., has awarded the general contract for the construction of the initial unit of its new plant in Appleton to the Hegner Construction Co. of that city. The building will be 75 x 300 feet in size, one-story, with saw-tooth roof, and will cost about $35,000 without equipment. A. Arthur Guilbert, Racine, is architect. T. M. Purtell is secretary of the company, with headquarters at 821 College avenue, Appleton.

APPLETON, WIS.—The Patton Paper Co. has purchased a site and 4000 acres on the Wolf river for its proposed new hydroelectric power plant, to be erected during the coming year. The company's engineers are preparing plans. The estimated cost is not given out.

BARABOO, WIS.—The E. F. Herfort Canning Co., Inc., will build a factory to cost $200,000.

PORT WASHINGTON, WIS.—The Turner Mfg. Co., manufacturer of gas engines, tractors and farm machinery, has increased its capital stock from $150,000 to $250,000 to provide for enlarging its plant.

MADISON, WIS.—The Benson Speed Signal Co. has been organized with $100,000 capital to manufacture signal and speed measuring devices by A. D. Campbell, H. R. Martin and Louis W. Wiedenbeck.

MARSHFIELD, WIS.—A $50,000 contract for veneer parts for aircraft has been placed with the Roddis Lumber & Veneer Co. by agents of the French government.

MARSHFIELD, WIS.—Blum Bros., box manufacturers, will spend about $15,000 in the erection of a factory addition and the installation of a complete veneer-cutting equipment to handle rough logs.

MILWAUKEE.—The Wisconsin Iron & Wire Works, 1660 Booth street, has leased its former plant at 186 East Water street, to the Eagle Knitting Co., 382 Broadway, which will remodel it into a knitting mill, driven by electric motors.

MILWAUKEE.—The W. Toepfer & Sons Co. has increased its capital from $50,000 to $100,000 to provide for expansion. Irwin G. Toepfer is president.

MILWAUKEE.—The Newport Mining Co., 1125 First National Bank building, a member of the Ferdinand Schlesinger group of iron ore, furnace, coke and gas and chemical from $1,500,000 to $4,500,000. The comproperties, has increased its capital stock pany is incorporated under the laws of Maine. The amount of the increase represented in Wisconsin is given as $58,500, in the application.

MILWAUKEE.—The Charles Jurack Pattern Works, 199-201 Oregon street, one of the largest firms of its kind in the northwest, has incorporated its business under the same name, with a capital stock of $50,000. The owners of the business are Charles, William R., and Charles G. Jurack, Jr. The plant is being enlarged.

MILWAUKEE.—John Loew, 449 Bartlett avenue, will erect a one-story machine and blacksmith shop, 50 x75 feet, on North, near Bartlett avenue, costing about $9000 complete. Leiser & Holst, architects, are taking bids.

MILWAUKEE.—The Milwaukee department of public works, through the central board of purchases, Willits Pollock, secretary, is taking bids until Saturday, Feb. 16, for a miscellaneous assortment of cast iron pipe and specials, as follows:

Notice No. C. P. 7.—500 tons of 6-inch; 150 tons of 8-inch, and 150 tons of 12-inch class C water pipe. About 100 tons of special lengths of standard B. & S. pipe, 20 to 24-inch diameters. 50 tons of special 3-way and 4-way curves, etc., from 4 to 16-inch diameters. Thirty 2-inch; thirty 3-inch; thirty 4-inch and twenty 6-inch special or tapping valves.

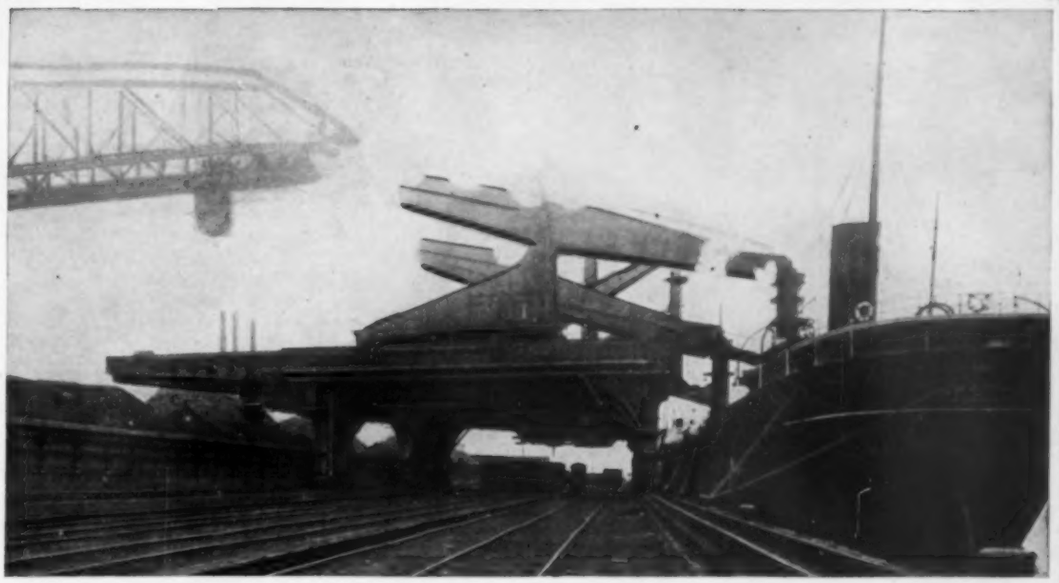
MONROE, WIS.—The Industrial Cooperative Union will erect a $60,000 cold storage warehouse. It will be three stories high and 50 x 127 feet. The architect, C. F. Ringer & Son, Milwaukee, has awarded the general contract to Wagner & Bauman, Monroe; the contract for steel to A. F. Wagner Co., Milwaukee, and for the refrigerator system to Vilter Mfg. Co. L. E. Gettle Madison, Wis., is secretary.

NEW LONDON, WIS.—Knapstein Bros, brewers, will award contracts soon for the remodeling of a part of their plant into a cold storage warehouse and refrigerating plant at a cost of about $15,000.

RACINE, WIS.—The Webster Electric Co., manufacturing small electric motors and motor-driven appliances, has incorporated its business with a capital stock of $600,000. A large plant addition is under construction. The owners are John B. Simmons, Walter Brown and P. G. Crewe.

SPARTA, WIS.—Ed. Dargle has opened a garage and machine shop in the former Edwards building, which has been rebuilt and equipped for the purpose.

SUPERIOR, WIS.—The Globe Shipbuild-



Steel Giants Do Work of Thousands of Men

All of the large modern ore docks constructed during the last six years have been equipped with **Hulett Boat Unloaders.** These machines have become a standard for unloading Iron Ore, and ***they are equally well adapted for unloading Coal.***

Hulett Unloaders are built in the following sizes and guaranteed capacities: **For Ore:** *17 Ton Buckets*, capacity 1,250,000 tons per season; *15 Ton Buckets*, capacity 1,000,000 tons per season; *10 Ton Buckets*, capacity 750,000 tons per season. **For Coal:** *8 Ton Buckets*, capacity 500,000 tons per season.

Hulett Unloaders require (1) fewest number of men, (2) lowest labor cost per ton, (3) lowest power cost per ton, (4) lowest maintenance cost per ton.

Complete Ore and Coal Handling Stations, equipped with Boat Unloaders, Car Dumpers, Rehandling Bridges, etc., are a specialty of The W-S-M Company.

Bulletins are in preparation on Ore and Coal Handling Machinery. *Send for your copies.*

The four Unloaders pictured above constitute the Pennsylvania Railway's Whisky Island installation at Cleveland, Ohio.

Principal Products of The W-S-M Company

Steel Plant Equipment:
Manipulators, Furnaces, Charging Machines, etc.
By-Product
Coke Oven Machinery.
Shipyard Cranes.
Hoisting and Mining Machinery.
Ore and Coal Handling Machinery.
Special Large Cranes.
Gas Producers, Gas Valves.
Hydraulic Turbines.
Johnson Hydraulic Valves.
Steel Castings.

WELLMAN SEAVER MORGAN COMPANY
CLEVELAND
OHIO U.S.A.

Say you saw it in THE IRON TRADE REVIEW

ing Co. has acquired an old flour mill site adjacent to its yards and shops and will construct several shipbuilding ways. A 1-story addition, 45 x 100 feet, is being erected for the pipefitting, blacksmithing and tinsmithing departments.

WAUPECA, WIS.—The Jorgenson Mfg. Co., which recently accepted a contract for furnishing about 25,000 castings and parts for military trucks for the government, has booked orders from seven Wisconsin automobile and truck manufacturers for gas engine primers for their 1918 outputs. The contracts call for more than 100,000 devices and are from the Nash Motors Co., Kenosha, Wis.; Mitchell Motors Co., and J. I. Case Threshing Machine Co., Racine, Wis.; International Harvester Co., Stegeman Motor Car Co., Sterling Motor Truck Co., and Harley-Davidson Motor Co., Milwaukee.

WEST ALLIS, WIS.—Jacob Karth has purchased the plant and business of the F. A. Gardner Machine Works, 75th and National avenues and is now in possession. Fred A. Gardner, former owner, has joined the Crown Metal Co., 871 Robinson avenue, Bay View, as general manager.

WEST BEND, WIS.—A 22-inch lathe, drill presses, an oxyacetylene welding outfit and other new equipment is being installed in the machine shop of Kuester Bros., proprietors of the Triangle Garage, West Bend.

ALMA, MICH.—The R. & P. Tractor Co., capitalized at $500,000, is preparing to erect a large plant here next spring. Channing Parsons is vice president and general manager.

CRYSTAL FALLS, MICH.—Quinnesec Iron Mining Co., capitalized at $250,000, has changed its name to the McKinney Steel Co.

DETROIT.—The Flower & Stephen Co. will build a factory addition costing $180,000.

DETROIT.—The Christie-Kline Forge Co., 64 St. Aubin street, will build a forge shop costing $30,000.

IONIA, MICH.—The Hays Mfg. Co., manufacturer of automobile bodies, is building an addition to cost $10,000.

JACKSON, MICH.—The Jackson Munition Corp. has been organized with $500,000 capital. Clarence B. Hays is president.

JACKSON, MICH.—The Sparks-Withington Co., North street, manufacturer of automobile radiators and fans, is building a factory 25 x 344 feet.

JACKSON, MICH. — Jackson Munitions Corp. is fitting out the plant of the Jackson Automobile Co. for the manufacture of 155 millimeter shells. The plants of the Mott Wheel Works and Jackson Cushion Spring Co., also are being utilized. William Kessler is supervising construction work.

JONESVILLE, MICH.—The city of Jonesville will install a centrifugal pump, direct connected to a 20-horsepower motor. A. T. Mewton is superintendent.

LANSING, MICH.—Duplex Truck Co., according to President H. M. Lee, will increase its production to 300 trucks a month for the remainder of the year.

PETOSKEY, MICH. — Blackner Rotary Pump Co. has increased its equipment to permit production of $360,000 worth of pumps annually. The company manufactured $200,000 worth in 1917. A. B. Klise has been re-elected president.

RIVER ROUGE, MICH.—Whitehead & Kales are building a machine shop 32 x 80 feet in size.

SAGINAW, MICH.—Peninsula Shell Co. is remodeling the plant of the Marquette Motor Works for the manufacture of munitions. It will open March 1 with 1600 employes. It will assemble the products of the General Motors Co. plants in Michigan.

SAGINAW, MICH.—Saginaw Shipbuilding Co. has laid the keel of its second ship. The plant is practically completed and is employing 250 men, which number will be increased to 800. The company has a contract with the government for six vessels all of which will be completely equipped here.

AURORA, ILL.—The Aurora Tool Works Co. has bought a site and will build an addition.

CAMP GRANT, ROCKFORD, ILL.—Plans for 12 one-story convalescent barracks adjacent to the hospital have been drawn. Congress will be asked to appropriate $40,800 for this work. With this addition Camp Grant hospitals will be able to take care of 2000 men.

CHICAGO. — Henry E. Pridmore, 1901 South Rockwell street, manufacturer of molding machines, will build a machine shop 50 x 60 feet, equipped with a crane, for which equipment has not yet been purchased.

Make Business Changes

THE general offices and branch sales office of the American Refractories Co. are now located at suite 315, Union Arcade building, Pittsburgh. The general sales offices will be located at 208 South La Salle street, Chicago. A branch sales office will be opened in the Equitable building, 120 Broadway, New York.

Mayer Bros, Inc.,, Antigo, Wis., power hammers, will move its plant and offices to Kaukauna, Wis., where it has secured the factory and business of A. W. McLean & Co. The latter company has been doing business under the name of the Kaukauna Machine Works.

The Asbestos Protected Metal Co., of Pittsburgh, has announced the removal of its New England office to the State Mutual building in Boston. William H. Cummings is in charge.

CHICAGO.—The Roth Mfg. Co., 118 South Clinton street, has bought a site at Sixteenth street and Kilbourn avenue and will build a plant.

CHICAGO.—The Harrington & King Perforating Co., J. M. Fuller, president, 612 North Union avenue, will build a one and 2-story plant 126 x 312 feet in size, at Taylor and Campbell avenues, to cost $100,000.

CHICAGO.—The West Steel Car & Foundry Co., 122 South Mchigan avenue, has has plans prepared by Dillard & Bacon, architects, for a 1-story steel factory addition at Brandon avenue and 136th street, to cost $60,000.

LINCOLN, ILL.—Rural school houses will be built this spring in the Lawndale and Victory districts.

MURPHYSBORO, ILL.—The board of education plans an improvement to the Douglas school, which, with the site, will cost from $15,000 to $20,000.

PEORIA, ILL. — The Domestic Electric Appliance Co. has been incorporated with $25,000 capital by R. B. Cherry, V. E. Hopkins and E. G. Kuecks.

PEORIA, ILL.—The Peoria Foundry Co. has been incorporated with $5000 capital by James Fitzgerald and J. F. Hadank.

DUNDEE, ILL.—The contract for the Main street bridge has been let to the Ottendorf Construction Co., Palatine, Ill. The bridge will be of reinforced concrete with a straight away and a temporary bridge. Contract price is $42,794.

ST. CHARLES, ILL.—The plant of the Faultless Stove Co. has been damaged by fire. The loss was $40,000.

EVANSVILLE, IND. — The Schroeder Headlight & Generator Co. has been incorporated with $150,000 capital. J. H. Schroeder, John D. Craft and William A. Carson are interested.

FORT WAYNE, IND.—Bids will be taken shortly for a bridge over the St. Joseph river at State and Fourth streets. A. W. Grosvenor, Bass block, is engineer.

INDIANAPOLIS, IND.—The Kelloniemi Mfg. Co. has been incorporated with capital of $10,000 to manufacture machinery. The incorporators are W. Kelloniemi, V. Viliki and W. Anderson.

KENDALVILLE, IND.—The Noble Heater Co. has been incorporated with $300,000 capital to manufactue automobile heaters. Gilbert A. Bartholomew, Clarence E. Baker and William S. Baker are incorporators.

MISHAWAKA, IND.—The contract for a 2-story bank and office building has been let by the Mishawaka Trust Co. to Fridstein & Co., Chicago. The building will have a granite and Bedford stone exterior with marble and mahogany fixtures.

MONTEREY, IND.—The Monterey Electric Light & Power Co. will build a power house 50 x 125 feet in size to cost $50,000.

MUNCIE, IND.—The Muncie Gear Co. will build a 1-story addition 139 x 450 feet in size at Clark and Penn streets. The Austin Co., 14230 Euclid avenue, Cleveland, is taking bids.

PIERCETON, IND.—The Knull Motor Co. has been incorporated with $30,000 capital to manufacture automobiles. L. R. Deboer, Carl F. Knull and George A. Scifer are incorporators.

VINCENNES, IND.—Plans have been drawn by J. S. Spiker, city engineer, for a bridge over the Wabash river connecting Indiana and Illinois to cost $200,000.

AKRON, O.—The Bridgewater Machine Co. has increased its capitalization from $20,000 to $250,000.

CINCINNATI.—The David Welding & Mfg. Co. has been incorporated with a capital of $75,000. The incorporators are Augustine Davis Jr., Arthur L. Betts, Floyd C. Williams, Peter Scola and Frank H. Shaffer.

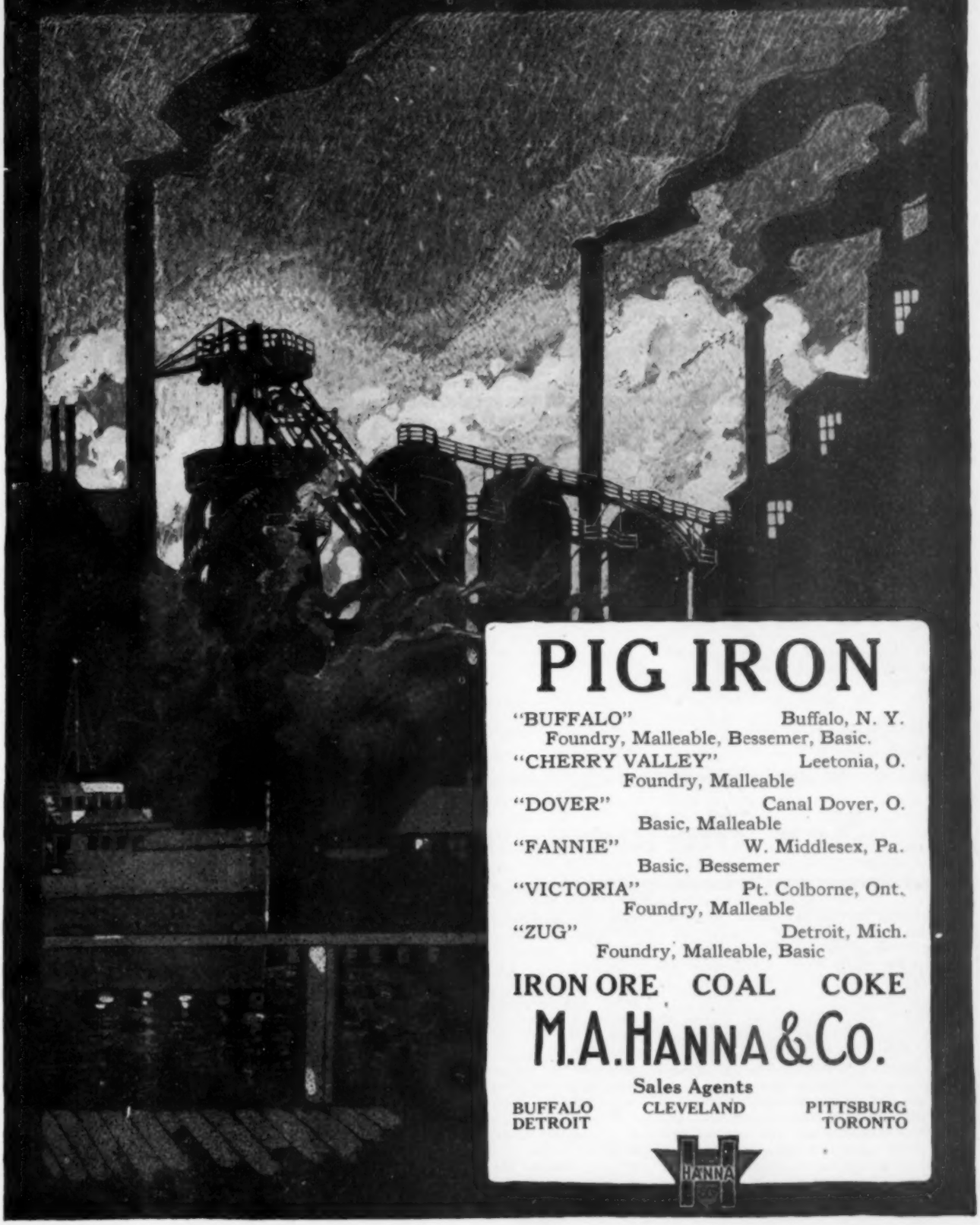
SANDUSKY, O.—The Sandusky Foundry & Machine Co. has taken out a city engineers permit to erect a $20,000 addition to its present building on West Market street. G. William Doerzbach is the contractor.

TOLEDO, O.—I. Gerson & Sons have recently incorporated under the name of the I. Gerson & Sons Co. The incorporators are E. H. Gerson, Samuel Gerson, Sol M. Gerson and S. H. Franklin. They will deal in iron and steel scrap, metals, etc.

MIDDLEBOURNE, W. VA.—Bids are desired by the Tyler Co. for the building of 100-foot, 2-span concrete arch bridge over Point Pleasant creek.

NAUGATUCK, W. VA.—Bids are desired by the Mingo Co., Williamson building, for the building of a steel bridge over Pigeon creek.

HANNA



PIG IRON

"BUFFALO" Buffalo, N. Y.
Foundry, Malleable, Bessemer, Basic.

"CHERRY VALLEY" Leetonia, O.
Foundry, Malleable

"DOVER" Canal Dover, O.
Basic, Malleable

"FANNIE" W. Middlesex, Pa.
Basic, Bessemer

"VICTORIA" Pt. Colborne, Ont.
Foundry, Malleable

"ZUG" Detroit, Mich.
Foundry, Malleable, Basic

IRON ORE COAL COKE

M.A. HANNA & CO.

Sales Agents

BUFFALO CLEVELAND PITTSBURG
DETROIT TORONTO

Western and Intermountain Territory

MINNEAPOLIS.—Thomas Blackwood, 1900 East Third street, will build a factory, 55 x 100 feet to cost $10,000.

CEDAR FALLS, IA.—The city will install a 150-horsepower boiler and make other improvements at the waterworks plant. C. H. Streetor is city engineer.

DAVENPORT, IA.—The Independent Motor Truck Co., 1801 North Third street, will build a factory.

DES MOINES, IA.—H. Cohen, Cohen Bros. Iron & Metal Works, 307 East Third street, is organizing a company with $1,000,000 capital which proposes to build a rolling mill.

RYAN, IA.—Fridstein & Co., Chicago, have secured the contract for a 1-story building containing a bank and two store rooms.

KANSAS CITY, MO.—The American Airship & Transportation Co. has obtained a Delaware charter with $2,000,000 capital to manufacture airplanes. J. W. Graves, W. H. H. Leach, C. A. Roff and J. W. Brown are interested.

KANSAS CITY, MO.—The stockholders of the Nevada Consolidated Mining Co. have authorized C. E. Swiane, engineer for the company to place an order for equipment for the construction of a mill on the property of the company in Nye county, Nevada. The mill will be in operation next fall.

ST. LOUIS.—The St. Louis Malleable Castings Co., Conduit avenue, plans to build a machine shop, forge shop, foundry and electric power plant.

EAGLE PASS, TEX.—The American Reinforced Concrete Tie Mfg. Co. will build a plant for the manufacture of reinforced railroad ties. W. F. Faunt is president.

CAMP FUNSTON, JUNCTION CITY, KANS.—The people of Missouri will be asked to give from $25,000 to $30,000 for a building for the 354th regiment of Missouri troops at this camp.

LEAVENWORTH, KANS. — The Victor Mfg. Co., manufacturer of electric washing machines and other devices, has increased its capital by $60,000 and will build a 2-story addition to double its output. F. J. Tallant is president.

WICHITA, KANS.—The Midland Valley Railroad Co. has purchased the old fair grounds and will build a new round house, shops and switching yards.

Up and Down the Pacific Coast

BELLINGHAM, WASH. — Bellingham & Northern railroad will rebuild its flood-damaged glacier line at a cost of about $20,000.

CHENEY, WASH.—The Fred A. Wilson Engineering Co., Central building, Seattle, will prepare plans for a new flour mill and grain elevator here, mill to have a capacity of 900 barrels of flour per day.

SEATTLE.—Bids will be received up to March 8 for construction of steel superstructure of the double-leaf bascule bridge over the Lake Washington canal on Eastlake avenue. This improvement consists of a steel superstructure, operating machinery and furnishing and erecting other parts of the superstructure described in the specifications. Contract will be for placing 243,000 pounds of machinery, 1,830,000 pounds of structural steel, 12,500 pounds of reinforcing bars, etc., this equipment having been purchased some time ago.

SPOKANE, WASH.—The Hallidie Co., 801 Railroad avenue, manufacturer of deck machinery and marine equipment, will build several plant additions and will install new equipment.

TACOMA, WASH.—Work is to start shortly on the proposed addition to the Sperry Flour Mill Co. plant, here cost about $175,000. John D. Armstrong is manager.

TACOMA, WASH.—City officials intimate that the municipal car line will be double-tracked from the east end of the viaduct to the Todd Shipbuilding plant to relieve traffic congestion.

PORTLAND, OREG.—The Universal Lock Nut Co., manufacturer of lock nuts, will build a plant to cost $50,000.

HUNTINGTON PARK, CAL.—The Warman Steel Castings Co., Douglas building, Los Angeles, will build an extension of 100 feet to its plant in Huntington Park.

OAKLAND, CAL.—The Premier Machinery Co., 16 California street, manufacturer of canning machinery, will build a 1-story factory on West Twenty-second avenue, to cost $10,000.

SAN DIEGO, CAL.—The Landis Electric Co. has been incorporated with $25,000 capital to manufacture electrical devices. The incorporators are Edward Jewell, Arthur J. Simpson and H. G. Landis.

SAN FRANCISCO. — W. R. Berry will build a 2-story concrete machine shop at Howard and First streets.

SAN FRANCISCO. — The Edwards Wire Works will rebuild its plant recently damaged by fire. M. L. Spangler is general manager.

New Business in Eastern Canada

AURORA, ONT.—The Aurora Foundries, Ltd., has been incorporated to carry on a general business as founder and machinist with $40,000 capital stock. Incorporators are Reginald A. Fraser, George W. Johnston and others.

AURORA, ONT.—The factory of the Office Bureau Co. was badly damaged by fire Feb. 4, with a loss of $70,000.

COCHRANE, ONT. — The St. Maurice Lumber Co. has been granted permission to carry on lumbering business in Ontario, to build and operate sawmills, planing mills, etc., with $60,000 capital; and has appointed Wilfrid Adams, Cochrane, Ont., to be its attorney.

COLLINGWOOD, ONT. — Ferguson & Wheatley, Ltd., have been incorporated to manufacture hardware, machinery, implements, tools, etc., with $40,000 capital stock. George H. Ferguson, Horace W. Wheatley and Thomas W. Phipps are the incorporators.

FORT WILLIAM, ONT.—The Canadian Car & Foundry Co. Ltd., 1209 Laughton street, will commence at once on the erection of a shipbuilding plant for turning out steel ships. Mr. Elster is in charge.

GANANOQUE, ONT.—The town council will make repairs and build additions to its waterworks and sewage plants and will install an electric pump to cost $15,000.

GUELPH, ONT.—The White Sewing Machine Co. of Canada, Suffolk street, will build an addition to its plant to cost $15,000 and has awarded the general contract to G. A. Scroggie, 400 Woolwich street.

HAMILTON, ONT.—Robert H. Hassler, Ltd., Indianapolis, Ind., is making preparations for the erection of a manufacturing plant at Hamilton, Ont., to cost $100,000. It is expected that building operations will be started in the spring.

HESPELER, ONT.—The washing machine and truck departments of the London Foundry Co., London, Ont., will be removed to Hespeler, where the company proposes to go into the manufacture of these products on an extensive scale.

LONDON, ONT.—The utilities commission is in the market for two electrically-driven waterworks pumps. Philip Pocock is chairman.

LONDON, ONT.—The London Soap Co., 197 Ottaway avenue, will build an addition to its factory to cost $5000. Proprietor is A. G. Phillips.

OJIBWAY, ONT. — The Canadian Steel

Corp. will start at once on the construction of a waterworks system for its plant to have a capacity of 7,000,000 gallons daily.

OTTAWA, ONT.—The Ketchum Mfg. Co., Ltd., has been incorporated to manufacture metal products with $40,000 capital stock. Zebulum C. Ketchum, Westboro, Ont., and Henry G. Ketchum, Ottawa, Ont., are incorporators.

OTTAWA, ONT. — The British America Nickel Co., it is reported, may possibly abandon its plan to establish a refinery at Sudbury, Ont. The report states that the company is now contemplating the erection of its plant in the Ottawa valley, where there is at present developed a surplus of hydro power over local consumption.

PEMBROKE, ONT.—The Colonial Lumber Co. will commence at once on the erection of a plant to cost $75,000.

SARNIA, ONT.—The Holmes Foundry Co. will commence at an early date on the erection of a plant to cost $100,000.

SAULT STE. MARIE, ONT.—Plans are under discussion for establishing a shipbuilding plant at the Soo. Before the war steps were taken to establish a shipbuilding plant in this city but work has been held up. Now it is proposed to launch into the construction of wooden ships in connection with the steel plant with a view to the building of steel ships at a later date.

STRATFORD, ONT. — The George McLagan Furniture Co. is in the market for a horizontal tubular steam boiler, size 16 feet long by 6 feet in diameter.

STRATHROY, ONT.—The Dominion Canners, whose plant was damaged by fire a few months ago, are having plans prepared and will commence the erection of a new plant in the spring to cost $100,000. The factory will be equipped with the most modern machinery obtainable.

TORONTO, ONT.—The planing mill owned by C. E. Williams, St. Albans street, has been damaged by fire with a loss of $3000. The plant will be rebuilt and new machinery to cost about $1000 will be required.

TORONTO, ONT.—The Metropolitan division of the Toronto & York Railway Co., car barns including repair shop, storehouse and a number of cars were damaged by fire Feb. 5, with a loss of $50,000. The plant will be rebuilt at once and some machinery for the repair plant will have to be replaced.

MONTREAL, QUE.—The Dominion Cement Co., 92 Notre Dame street east, will build a cement plant to cost $100,000.

SOREL, QUE.—The foundry owned by La Cie d'Entreprises Metallurgiques, was damaged by fire Feb. 6, with a loss to plant and equipment of $50,000. The plant will be rebuilt immediately.

THREE RIVERS, QUE.—The Page Wire Fence Co., Walkerville, Ont., proposes to build a manufacturing plant at Three Rivers next spring to cost $150,000, and will be in the market for motors and other equipment.

New Trade Publications

BLOW TORCH.—An interesting folder describing a gas-electric portable blow torch designed for melting metals, making pattern castings, straightening bars, bending tubing, heating rivets, soldering, fitting boiler patches, skin drying molds and drying cores, is being distributed by the Naab Mfg. Co., Cleveland.

MACHINE TOOL PUMP.—An attractive folder describing and illustrating machine tool pumps has recently been published by the Fulflo Pump Co., Cincinnati. The folder shows many views of the pump, enumerates a list of advantages which it is claimed to possess and reproduces several letters received from satisfied users of the product.

SELF OPENING DIES.—The Greenfield Tap & Die Corp., Greenfield, Mass., has recently issued an attractive 24-page booklet describing its line of self-opening threading dies which are applicable to manufacturing automatics, screw machines, lathes, drill presses, etc. The booklet contains 28 illustrations and the construction and operation of the dies is explained in a complete manner.

ELECTRIC HOISTS.—The Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., recently published a 24-page folder describing and illustrating electric hoists and showing the diversified line of enterprise to which they may be adapted. Reproductions of photographs showing simple hoists, and hoists with gear trolleys at work in foundries, shipping rooms, machine shops, scaling departments, lumber yards, etc., are presented. Hoists with geared trolleys are furnished in capacities ranging from 1 to 20 tons and are furnished with plain, geared or motor-driven trolleys.

FORGING PRESSES.—A 48-page booklet has been issued by the United Engineering & Foundry Co., Pittsburgh, describing a line of high-speed, steam - hydraulic forging presses. The presses are built in a range of sizes from 150 to 12,000 tons capacity for all kinds of forging, pressing and shearing. The booklet is well illustrated and descriptions of each type of press are included. Some interesting illustrations of actual forgings are also presented. These are fully dimensioned and the actual forging time for each piece is given. Tables giving the standard dimensions of the company's presses and a table of steam pressures in pounds per square inch are also included.

SAFETY HANGERS.—The Thompson Electric Co., Cleveland, is distributing a 24-page booklet devoted to safety hangers. These hangers curve horseshoe style at the top and lamps are suspended from the curved portions. This arrangement permits the lamp to be lowered and rehoisted for cleaning whenever desired. The lamp is unlocked from its position on the hanger by pulling a rope. All danger of shock to the caretaker is said to be obviated because when the lamp is released from its position on the hanger it is automatically and electrically disconnected. The bulletin reproduces a number of photographs of lamps and also presents detailed views of the lock, enabling the reader to obtain a comprehensive idea of its arrangement.

DRAWING TABLES.—The Hein Furniture Co., Toledo, designers and manufacturers of special furniture, interior wood work and cabinet work, is distributing a comprehensive bulletin devoted to drawing tables and filing cases. Tops of all tables and drawing boards are made of soft white pine glued up from strips three to five inches in width. Ends of table tops are fitted with hardwood straight edges set in grooves. All other exposed parts of table are plain oak, save the legs, which are made of elm. The loose inclined drawing board is made ⅞ inch thick with two cross pieces to prevent warping. The board is inclined by turning raising blocks 2½ inches high. Each type of table and cabinet is individually illustrated and specified in the bulletin.

RIVETERS.—A new catalog describing the full line of riveters handled by the Vulcan Engineering Sales Co., 1765 Elston avenue, Chicago, for the Hanna Engineering Works, has been issued. Considerable space in the catalog is devoted to descriptions of special machines adapted to shipbuilding. Many designs of riveters suitable for use in automobile plants, boiler, tank and locomotive shops also are presented. A comprehensive description of the Hanna link motion is given. This motion is employed exclusively on Hanna type riveters. It is so adjusted that a predetermined and practically uniform pressure is developed on the die during approximately the last half of the piston stroke, or what amounts to about the last half inch of die travel. Therefore, it is said, only a single stroke of the die screw is necessary to take care of ordinary variations in the length of rivets, thickness of plates, size of holes, etc. The aim of the designer of the Hanna riveter was to develop a machine which would give results comparable with hydraulic riveting when using compressed air.

BOILERS.—"Finding and Stopping Waste in Modern Boiler Rooms" is the title of a complete boiler room manual recently published by the Harrison Safety Boiler Works, Philadelphia. The booklet is 274 pages in length. It includes information on almost every line of boiler room practice and methods of securing and maintaining plant economy that the owner or operator might need. The booklet is divided into sections, section I being devoted exclusively to data on fuels such as their analysis, size, appraisal, method of sampling, mixing, nitrogen determination, heating value, etc. Section II is devoted to combustion and presents information on such features as air theoretically required for combustion, air required for different fuels, grates, grate surfaces and firing, types of fuel employed, thickness of fire, automatic stokers, traveling grates, overfeed stokers, automatic furnaces, underfeed stokers, furnace temperatures, furnace gases, clinker draft, boiler draft, flue proportions, stack proportions, mechanical drafts, draft gages, dampers and flue gas temperatures. Section III is devoted to heat absorptions. This section likewise contains many ramifications, the most important of which are heat transmission by conduction, by convection and by radiation, heat transfer, economizers (air heaters and superheaters), methods of improving absorption, heating surface (including boiler capacity), boiler setting, refractories, soot, scale, methods of softening water, feed weight heating, exhaust steam heating. Section IV is devoted to boiler efficiency and boiler testing; Section V to boiler plant proportioning.

Iron and Steel Prices

Corrected to Tuesday Noon

IRON ORE

Superior Ores, Per Ton, Lower Lake Ports	
Old range Bessemer, 55 iron	$5.95
Mesabi Bessemer, 55 iron	5.70
Old range non-Bess., 51½ iron	5.20
Mesabi non-Bess., 51½ iron	5.05

WAREHOUSE PRICES

Steel bars, Chicago	4.10c
Steel bars, Cleveland	4.035c
Steel bars, Detroit	4.085c
Steel bars, Philadelphia	4.10c
Steel bars, New York	4.095c
Steel bars, St. Louis	4.17c
Steel bars, Cincinnati	4.085c
Steel bars, St. Paul	4.22c
Steel bars, Buffalo	4.05c
Iron bars, Buffalo	4.65c
Iron bars, Chicago	4.10c
Iron bars, Cleveland	3.985c
Iron bars, Detroit	4.75c
Iron bars, St. Louis	4.17c
Iron bars, Cincinnati	4.085c
Iron bars, Philadelphia	4.50c
Iron bars, New York	4.659c
Shapes, Chicago	4.20c
Shapes, Detroit	4.185c
Shapes, St. Louis	4.27c
Shapes, St. Paul	4.32c
Shapes, New York	4.195c
Shapes, Cleveland	4.135c
Shapes, Philadelphia	4.20c
Shapes, Buffalo	4.15c
Shapes, Cincinnati	4.185c
Plates, Buffalo	4.40c
Plates, Chicago	4.45c
Plates, Detroit	4.435c
Plates, St. Louis	4.52c
Plates, St. Paul	4.57c
Plates, New York	4.445c
Plates, Cleveland	4.385c
Plates, Philadelphia	4.45c
Plates, Cincinnati	4.435c
No. 10 blue anl. sheets, Chi.	5.45c
No. 10 blue anl. sheets, Cleve.	5.35c
No. 10 blue anl., Buffalo	5.40c
No. 10 blue anl., sheets, St. L.	5.52c
No. 10 blue anl. sheets, Cinci.	5.435c
No. 10 blue anl. sheets, St. Paul	5.57c
No. 10 blue anl. sh., Detroit	5.435c
No. 28 black sheets, Chgo.	6.45c
No. 28 black sheets, Cleve.	6.35c
No. 28 black sheets, Cinci.	5.45c
No. 28 black, Detroit	6.435c
No. 28 black sheets, St. L.	6.52c
No. 28 black sheets, St. Paul	6.57c
No. 28 galv. sheets, Chgo.	7.70c
No. 28 galv. sheets, Cleve.	7.60c
No. 28 galv. sheets, Cinci.	6.635c
No. 28 galvanized, Detroit	7.685c
No. 28 galv. sheets, St. L.	7.77c
Hoops, Cleveland	4.885c
Hoops, Detroit	4.935c

IRON AND STEEL SCRAP

STEEL WORKS USE
(Gross Tons)

Bundled sheets, Pittsburgh	$22.00 to 23.00
Bundled sheets, Cleveland	24.50 to 25.25
Bundled sheets, Buffalo	22.00 to 24.00
City wrought, short, N. Y.	27.50 to 28.00
Frogs, switches, guards, St. L.	30.00 to 31.00
Frogs, switches, guards, Chgo.	30.00
Heavy melting steel, Pitts.	30.00
Heavy melting steel, Buffalo	30.00
Heavy melting steel, Chgo.	30.00
Heavy melt'g steel, Cleveland	30.00
Heavy melting steel, Cinci.	27.00 to 27.50
Heavy melt'g steel, east. Pa.	30.00
Heavy melting steel, N. Y.	29.50 to 30.00
Heavy melting steel, St. L.	29.50 to 30.00
Heavy melting steel, Birming.	25.00 to 27.50
Hydraulic press. sheets, Cleve.	28.50 to 29.50
Hydraulic press. sheets, Pitts.	27.00 to 28.00
Hydraulic press. sheets, Chgo.	27.00 to 27.50
Low phos. steel, Buffalo	40.00
Low phos. steel, Pittsburgh	40.00
Low phos. steel, eastern Pa.	40.00
Shoveling steel, Chicago	30.00
Shoveling steel, St. Louis	28.00 to 28.50
Steel rails, short, Chicago	34.50 to 35.00
Steel rails, short, Cleveland	32.00 to 33.00
Steel rails, short, St. Louis	36.50 to 37.00
Steel rails, old, Birmingham	28.00 to 30.00
Stove plate, Cincinnati	19.50 to 20.00
Stove plate, St. Louis	20.50 to 21.00
Stove plate, N. J. points	22.50
Stove plate, Birmingham	19.00 to 21.00
Stove plate, Buffalo	25.00
Stove plate, eastern Pa.	23.00 to 24.00
Stove plate, Cleveland	21.00 to 22.00
Stove plate, Pittsburgh	20.00 to 21.00
Cast iron borings	11.00 to 12.00

(Net Tons)

Boiler plate, cut, No. 1, Chgo.	$22.00 to 23.00
Boiler plate, cut, No. 1, St. L.	25.50 to 23.00
Bundled sheets, Cincinnati	20.00 to 20.50
Knuckles, coup., Chicago	34.00 to 34.50
Knuckles, coup., St. Louis	31.50 to 32.00
Springs, Chicago	37.50 to 38.00
Stove plate, Chicago	22.50 to 23.50

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:	
Cleveland	$0.95
Newark, N. J.	3.50
Boston	3.70
Philadelphia	3.30
Pittsburgh	.95
St. Louis	3.18
Minneapolis, St. Paul	4.54
Buffalo to:	
Albany, N. Y.	$1.26
New England (rail)	3.10
New York and Brooklyn (rail)	3.10
Virginia furnaces to:	
Philadelphia	$3.27
New England	3.77
Brooklyn, Jersey City, Newark	3.52
Birmingham, Ala., to:	
Boston	6.00
Cincinnati	2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
Minneapolis, St. Paul	5.85
New York (r. and w.)	6.00
Philadelphia (r. and w.)	5.25
Pittsburgh	4.90
Savannah, Ga.	2.75
St. Louis	3.40
Chicago to:	
Des Moines	$2.80
Milwaukee	.50
Minneapolis, St. Paul	2.00
Moline, Ill.	1.15
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58
Minneapolis, St. Paul	4.54
Duluth, Minn., to:	
Minneapolis- St. Paul	$1.25
Mayville, Wis.:	
Minneapolis-St. Paul	$1.75

Freight Rates, Finished Material

Pittsburgh, carloads, per 100 lbs., to:	
New York	19.5 cents
Philadelphia	18.5 cents
Boston	21.5 cents
Buffalo	16.0 cents
Baltimore	18.0 cents
Cleveland	13.5 cents
Cincinnati	17.0 cents
Chicago	21.5 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	82.5 cents
St. Louis	27.0 cents
New Orleans	30.0 cents
Birmingham	45.0 cents
Pacific coast (all rail)	75.0 cents
Pacific coast (tin plate)	75.0 cents

IRON MILL USE
(Gross Tons)

Busheling, No. 1, Cleveland	29.00 to 30.00
Busheling, No. 1, Buffalo	32.00
Busheling, No. 2, Buffalo	22.00 to 24.00
Busheling, No. 1, Pittsburgh	32.00
Cast borings, New York	17.00
Cast borings, eastern Pa.	20.00
Cast borings, Cleveland	20.00
Cast borings, Buffalo	19.00 to 20.00
Cast borings, Pittsburgh	20.00
Cast borings, Birmingham	13.00 to 15.00
Cast borings, Chgo.	19.00 to 19.50
City wrought, long, N. Y.	32.00 to 32.50
Cut forge, Chicago	33.50 to 34.50
Forge flashings, small, Cleve.	26.50 to 27.00
Forge flashings, large, Cleve.	27.50 to 28.00
Forge No. 1, Eastern Pa.	27.50
Grate bars, Buffalo	25.00
Grate bars, Cleveland	21.50 to 22.50
Grate bars, N. J. points	22.50
Iron axles, Pittsburgh	42.00 to 44.00
Iron axles, Cincinnati	43.00 to 43.50
Iron axles, Cleveland	47.50
Iron axles, eastern Pa.	47.50
Iron axles, Chicago	47.50
Iron axles, Buffalo	45.00 to 47.00
Iron rails, Chicago	39.00 to 40.00
Iron rails, Buffalo	37.00 to 38.00
Iron rails, Cincinnati	32.00 to 32.50
Iron rails, St. Louis	34.00 to 35.00
Iron rails, Cleveland	35.00
Machine turnings, Cleve.	20.00
Machine turnings, Buffalo	18.00 to 18.50
Machine turnings, N. Y.	16.50
Machine turnings, Pitts.	20.00
Machine turnings, east. Pa.	19.50 to 20.00
Machine turnings, Birming.	17.50 to 19.00
Machine turnings, Chgo.	19.00 to 19.50
Pipes and flues, Cleveland	25.50 to 26.50
R. R. mch. cast, No. 1, Buff.	35.00
R. R. wrgt. No. 1, Buffalo	35.00
R. R. wrgt., No. 1, east, Pa.	35.00
Railroad wrgt., No. 1, Cleve.	35.00
R. R. wrought, No. 1, Pitts.	35.00
Railroad wr'ght, No. 1, Chgo.	35.00
Railroad wr'ght, No. 2, Chgo.	34.50 to 35.00
R. R. wrgt. No. 1, Birming.	27.00 to 30.00
Wrought pipe, Buffalo	29.00
Wrought pipe, eastern Pa.	30.00 to 32.00
Wrought pipe, New York	31.00

(Net Tons)

Angle bars, iron, Chicago	$37.50 to 38.00
Angle bars, steel, St. Louis	31.50 to 32.00
Arch bars & transoms, St. L.	42.00 to 42.50
Arch bars & transoms, Chgo.	38.00 to 39.00
Busheling, No. 1, Chicago	25.50 to 26.50
Busheling, No. 1, Cincinnati	24.00 to 24.50
Busheling, No. 1, St. Louis	26.00 to 26.50
Busheling, No. 2, Chicago	17.50 to 18.50
Cast borings, Cincinnati	15.50 to 16.00
Cast borings, St. Louis	16.00 to 16.50
Iron axles, St. Louis	45.00 to 45.50
Iron axles, Chicago	47.50
Machine turnings, Cinci.	15.50 to 16.00
Machine turnings, St. L.	17.25 to 17.75
Pipes and flues, Chicago	24.00 to 25.00
Pipes and flues, St. Louis	24.50 to 25.00
Railroad wrgt., No. 1, Cinci.	30.00 to 30.50
Railroad wrgt., No. 1, St. L.	31.00 to 31.25
Railroad wrgt., No. 2, St. L.	29.50 to 30.00

IRON OR STEEL WORKS USE
(Gross Tons)

Axle turnings, Cleveland	$24.00 to 25.00
Axle turnings, Buffalo	26.50 to 27.00
Shafting, New York	37.50 to 38.00
Shafting, eastern Pa.	45.00 to 47.50
Steel car axles, Birmingham	32.00 to 33.00
Steel car axles, New York	45.50 to 46.00
Steel car axles, Buffalo	45.00 to 47.00
Steel car axles, Cleveland	45.00
Steel car axles, Pittsburgh	40.00 to 42.00
Steel car axles, eastern Pa.	47.50
Steel car axles, Chgo.	47.50

(Net Tons)

Shafting, St. Louis	33.50 to 34.00
Steel car axles, St. Louis	43.00 to 43.50

IRON FOUNDRY USE
(Gross Tons)

Car wheels, (iron), Pitts.	$30.00
Car wheels, (steel), Pitts.	33.00 to 35.00
Car wheels, eastern Pa.	30.00
Car wheels, Buffalo	30.00
Car wheels, Chicago	30.00
Car wheels, St. Louis	29.50 to 30.00
Car wheels, Birmingham	25.00 to 30.00
Car wheels, Cleveland	30.00
Tram car wheels, Birming.	21.00 to 25.00
Cast, No. 1, eastern Pa.	34.00 to 35.00
Cast, No. 1, Birmingham	25.00 to 26.00
Cast, 1, machy. N. J. points	29.50 to 30.00
Cast No. 1, Cleveland	30.00
Cast, 1, heavy, N. J. points	29.50 to 30.00
Cast, 1, machy., N. J. points	30.00 to 31.00
Cast No. 1, Chicago	30.00
Cast, No. 1, Pittsburgh	28.00 to 29.00
Malleable, Cincinnati	30.00 to 35.00
Malleable, Cleveland	30.00 to 35.00
Malleable, Buffalo	30.00 to 35.00
Malleable, Pittsburgh	30.00 to 35.00
Malleable, east. Pa.	30.00 to 35.00
Malleable, Chgo.	30.00 to 35.00

(Net Tons)

Cast, No. 1, Cincinnati	26.00 to 26.50
Cast, No. 1, St. Louis	24.50 to 25.00
Malleable railroad, St. Louis	26.25 to 26.75
Malleable agricultural, Chgo.	24.00 to 25.00
Malleable agricultural, St. L.	24.50 to 25.00

MISCELLANEOUS USES
(Gross Tons)

Reroll. rails, 5 ft. & ov., Pitts.	$35.00
Reroll. rails, 5 ft. & ov., Chgo.	35.00
Reroll. rails, 5 ft. & ov., E. Pa.	35.00
Reroll. rails, 5 ft. & ov., St. L.	34.00 to 35.00
Reroll. rails, 5 ft. or over, Cleve.	33.00
Rerolling rails, long, Birming.	37.50 to 38.50
Locomotive tires, Chgo.	42.50 to 43.50

(Net Tons)

Boiler punchings, Chicago	32.00 to 33.00
Locomotive tires, St. Louis	33.50 to 34.00